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OCEANOGRAPHIC DATA REPORT FOR SOUTH WEST PACIFIC CRUISES IN THE SEAMAP SERIES. PART 1. SUMMER SURVEY DATA 1984 TO 1987

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MARITIME SYSTEMS DIVISION
WEAPONS SYSTEMS RESEARCH LABORATORY

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Temperature Inversions at Intermediate Depths in the Antarctic Intermediate Waters of the South-western Pacific

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Abstract

Deep (about 1000 m) marked temperature inversions and/or salinity reversals found in conductivity-temperature-depth profiles in the south-western Pacific for 1985 to 1987 are shown to arise from confluences of different branches of the Antarctic Intermediate Water (AAIW). Salinity reversals lead to the presence of several intermediate-depth salinity minima instead of the simple broad minimum in the vertical usually described as characterizing the presence of AAIW in this area. The anomalies are found at particular locations, often near ridges and rises. Significantly differing thermohaline properties acquired by the branches from mixing over separate travel paths apparently allows the formation of temperature inversions by isentropic penetrations. Some perturbations are dynamically caused in that at least one branch of AAIW is transported in association with strong surface currents with deep influence. Other confluences are caused by topographic control on AAIW flows moving independently of surface currents. Perturbations south of the Subtropical Convergence are related to the initial formation of the AAIW, but these are not of major interest in this analysis, being well known and simply explained. Locations of perturbations correspond in some areas to flow patterns of intermediate waters inferred by researchers using historical data, and they indicate other areas where the flow patterns need more investigation. Some comments are made on East Australian Current outflows from the Tasman and Coral Seas that have considerable influence on the flow of branches of the AAIW. Other remarks are made concerning the peculiarities of the temperature–salinity regime of the Tasman Front, which inhibits the formation of temperature inversions at depth. In general, the medium- and fine-scale structure in the central Tasman is that of the stepped type, with intrusive type in other areas.

Introduction

CTD (conductivity-temperature-depth) profiles obtained in the south-western Pacific show marked temperature inversions or salinity reversals in the depth range 700–1300 m, occurring at particular locations (Fig. 1). The perturbations occurred about the minimum in salinity associated with the Antarctic Intermediate Water (AAIW) mass. Perturbations at these depths do not seem to have been previously reported for the south-western Pacific. Reid (1973), for example, describes temperatures of the Scorpio expeditions along latitudes 28°S and 43°S as being monotonically decreasing to great depths. Continuous profiles were taken on the Scorpio expeditions by an STD (salinity-temperature-depth) profiler (Reid 197 5), although they are not included in the Scorpio data reports. Initial CTD stations occupied in the present study were sited in the central Tasman, where such perturbations apparently seldom occur, so their unexpected appearance in other areas first suggested instrumental malfunction or, for smaller perturbations, some type of instrumental structure (e.g. Pingree 1971). The perturbations are shown to be real by (1) their repeatability at or

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near the same locations in different years and seasons, by (2) independent measurements made concurrently with a sound-speed sensor, and, indirectly but more importantly, by (3) relating their geographic occurrence to flow patterns and water mass movements at intermediate levels in the survey area.

Continuous STD profiles taken on various expeditions of the USNS *Eltanin* can be used in some areas to augment the data set. An examination of *Eltanin* profiles shows deep temperature and salinity perturbations in the higher latitudes of the Southern Ocean, south of the Subtropical Convergence and generally south of 50°S. These are directly related to initial surface cooling, sinking and formation of several water masses and are therefore caused by mechanisms different from those discussed in the present analysis, except for some south of the Chatham Rise. Perturbations discussed herein occur in waters that have travelled some distance from their formation area, have reached their density level, and are not actively being formed, although mixing will continue to take place along their movement path.

Salinity and associated temperature-salinity profiles for the waters about the AAIW salinity minimum in the central Tasman Sea are smooth with a broad minimum in the vertical since the AAIW has been well mixed with other waters when it reaches this area (e.g. Wyrtki 1962*a*). The perturbations can be conveniently described in terms of such adjacent smooth profiles, and this is the general approach used here. It is primarily the deep temperature inversions that are of most interest in this analysis, and their general origin in terms of broad flow dynamics is described, together with some general comments on flow at intermediate and upper levels. Detailed water mass analyses are not considered.

Data and Processing

From August 1985 to November 1987, CTD stations were occupied on several surveys in the southwestern Pacific (Fig. 1) from the Royal Australian Navy oceanographic research vessel HMAS *Cook*. Five cruises of a series known as Project Seamap made by the Royal Australian Navy Research Laboratory (RANRL; now part of Maritime Systems Division, Weapons Systems Research Laboratory) occupied CTD stations in the area between Australia, New Zealand, Chatham Island, Samoa and Lord Howe Island (15–47°S,150°E–170°W). The Seamap tracks were traversed in both summer and winter, but usually not within a calendar year. Five other cruises occupied CTD stations from Australia to the Lord Howe Rise (28–37°S,150–165°E). Cruise tracks east of 165°E lie along three radials from Sydney, so large areas are unsampled. Continuous profiles from STD profilers taken on various expeditions on the USNS *Eltanin* can be used in some areas to augment the Seamap data set. (A key to *Eltanin* STD positions is given in Jacobs *et al.* 1972.)

The CTD data were obtained with a Plessey model 9041 instrument having a sampling rate of 1·66 Hz, conductivity and temperature resolutions of 0·005 mmho cm^{-1} (1 mho ≡ 1 S) and 0·005°C, and a pressure resolution of 2·4 dbar (1 bar ≡ 10^5 Pa). Conductivity and temperature were recorded to 0·01 units, pressure to 1 decibar. Lowering rate below 300 m was 50 m min^{-1} (equivalent to samples spaced at 0·5-m intervals). Calibrations were determined by comparison with samples taken by Niskin bottles mounted 1 m above the CTD in a rosette sampler, which was not available for all cruises. For cruises without a rosette sampler, a single Nansen bottle was triggered above the CTD. Pressure accuracy is 6 dbar, temperature accuracy is 0·015°C, and conductivity accuracy is 0·02 mmho cm^{-1} or better at intermediate depths (Hamilton 1986). The temperature sensor is a platinum-wound resistor with highly linear output, the conductivity sensor is an inductive type, and the pressure sensor is a strain gauge. Data for downcasts were presmoothed with a two-point-centred running average, filtered to match temperature and conductivity time constants (though this had little effect on salinity calculations because of the low data rate), and then initially averaged over 2-dbar intervals for calculation of derived parameters. Only monotonically increasing pressure values were used. The averaging interval for geostrophic current calculations discussed in this analysis was increased to 10 dbar.

The calibrations for the temperature and conductivity sensors are simple linear equations, nominally with fixed slopes and constants. However, the conductivity sensor was sometimes subject to shifts in the constant of the linear calibration from one station to the next on some cruises, and on a few occasions shifts occurred during a particular station, so good absolute salinity calibrations could not always be obtained. This could have led to doubt about some conductivity (and therefore salinity)

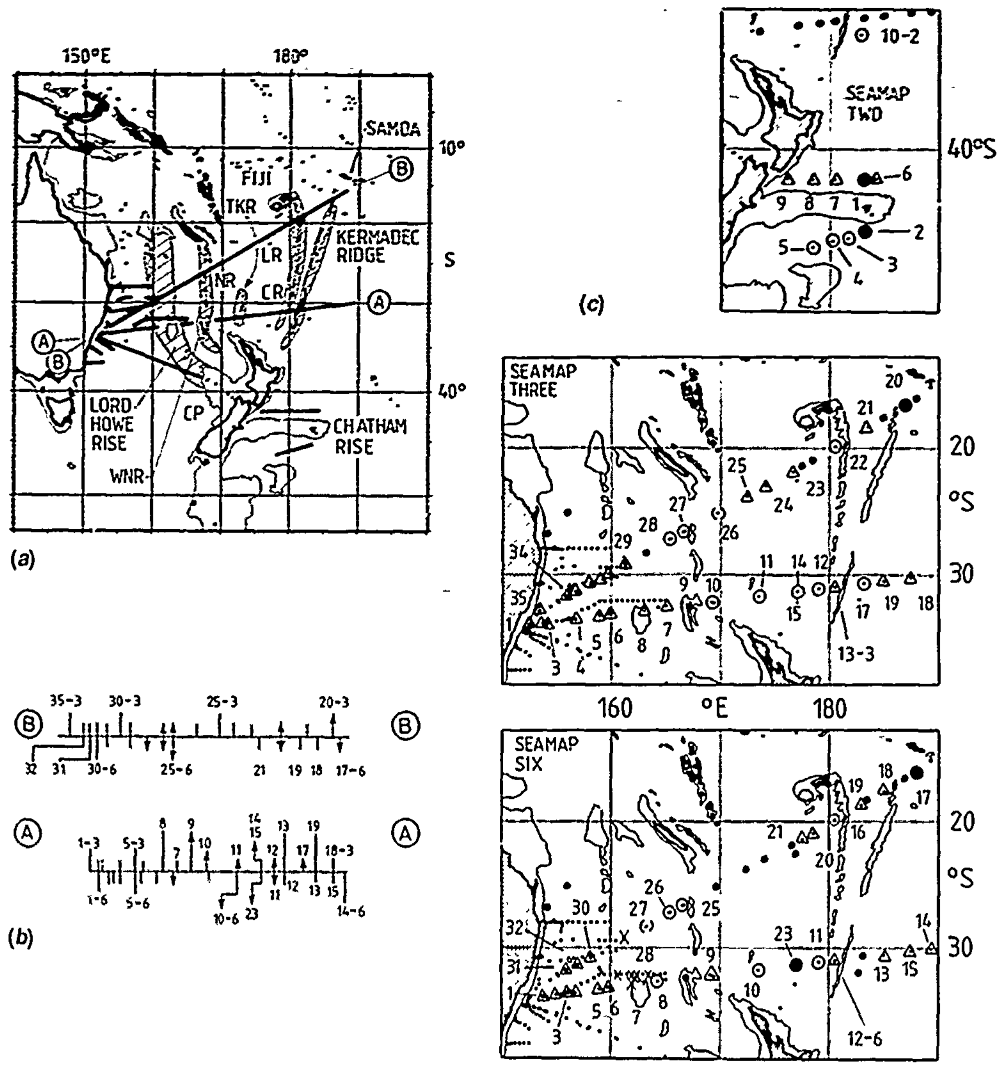
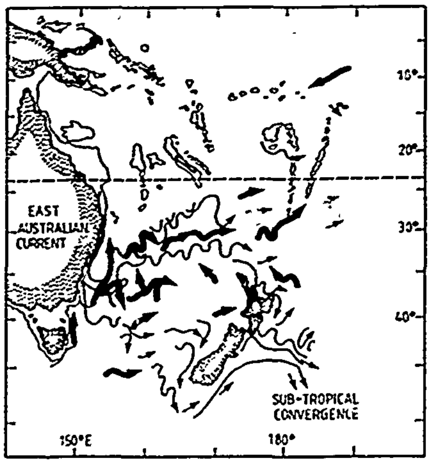
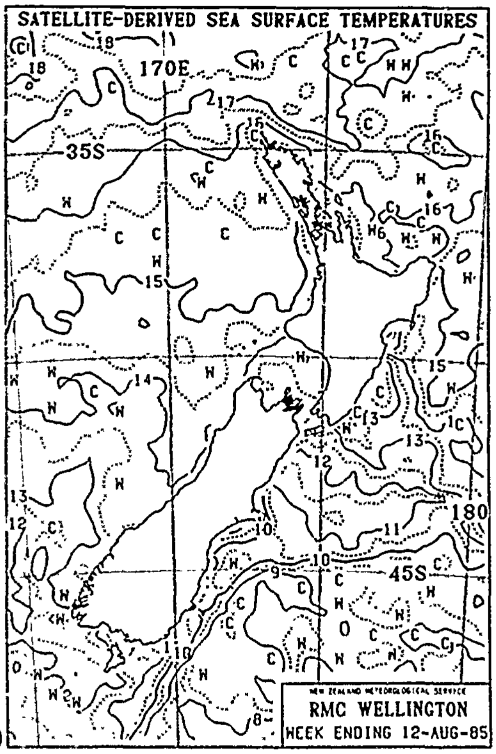


Fig. 1. (*a*) Routes of CTD surveys conducted from HMAS *Cook* by the Maritime Systems Division, Defence Science and Technology Organisation, in the south-western Pacific Ocean from July 1985 to November 1987. Routes A–A, B–B and A–CP were traversed in both summer and winter. Bottom topography is shown for depths of 1000 m and shallower, with hatched areas indicating ridges, rises and island chains. CP, Challenger Plateau; CR, Colville Ridge; LR, Lae Ridge; NR, Norfolk Ridge; TKR, Three Kings Ridge; WNR, West Norfolk Ridge. (*b*) Stations along radials A–A and B–B for Seamap survey 3 (summer 1986) and Seamap survey 6 (winter 1987). Arrowheads, stations showing perturbations. Station numbering: station 35-3, for example is the 35th station in Seamap 3 survey. Only Seamap stations are numbered. (*c*) CTD station positions for three Seamap surveys: about Chatham Rise for Seamap survey 2 (winter 1985), Seamap survey 3 (summer 1986), and Seamap survey 6 (winter 1987). CTD sites for other surveys indicated in (*a*) are also shown but not identified. These other sites did not show marked temperature inversions, but bottom mixed layers and sharp bottom thermoclines were seen on Lord Howe Rise in May–June 1987 at depths of more than 1000 m. △, unperturbed stations; ●, stations showing marked temperature and salinity perturbations at intermediate depths; ○ and ( ), stations showing progressively smaller perturbations; ×, stations showing bottom mixed layers at intermediate depths on Lord Howe Rise.

profiles, but independent verifications were obtained from a sound-speed sensor also fitted to the CTD, from the temperature profile, and from agreement for upcasts and downcasts, both of which were logged. The sound-speed sensor was a sensitive indicator for the perturbations (Fig. 3*a*). Further, perturbations were found at or near the same sites sampled 18 months apart (Figs 1*b* and 1*c*). One such site (14,15-3) also showed perturbations twice on the same cruise, with a 35-h interval between casts.



(*a*)



(*b*)

Fig. 2. (*a*) Surface frontal and flow patterns for the times of the Seamap cruises (from XBT, Nansen, CTD, drifting-buoy and underway data and satellite products shown in Hamilton and Boyle 1989, 1990). Thick arrows, buoy tracks; thin lines and arrows, surface fronts and inferred directions of surface flow. Main features are the East Australian Current system, the Subtropical Convergence, and the eastward Tasman Sea outflow from north of New Zealand to New Caledonia. (*b*) Sea-surface temperature field derived from analysis of satellite infrared data by the Royal Meterorological Centre, Wellington. The Subtropical Convergence may be seen as a front about the 10°C isotherm east of New Zealand's South Island.

The CTD data were supplemented with more closely spaced expendable-bathythermograph (XBT) temperature profiles, nominally to 750 m, and a limited number of surface samples. Because the CTD salinity data were not consistent between surveys, the observed perturbations are often described herein chiefly in terms of the CTD temperature profile. The most striking manifestations of the perturbations are usually deep temperature inversions, and these unusual phenomena are adequate to describe the main effects of interest.

General surface conditions for the times of the cruises are shown in Fig. 2*a* as surface currents and frontal positions. Surface and intermediate current regimes are found to be related in several of the areas discussed. Fig. 2*a* is a composite of summer and winter data showing general trends, not detailed results of surveys. More detailed results may be found in Hamilton and Boyle (1989, 1990). An example of sea-surface temperature fields about New Zealand derived by the Royal Meteorological Centre, Wellington, for satellite infrared data is shown in Fig. 2*b*. These are useful in showing the Subtropical Convergence south and east of New Zealand, a front that is related to formation of the AAIW.

General Results—Intermediate-depth Perturbations

Geographical and temporal distributions (Fig. 1) clearly show that the perturbations are not uniformly found but occur at particular locations, often near ridges. It is notable that perturbations do not generally occur in the central Tasman, despite the relatively higher station density there. Temperature (and sound-speed) profiles from several cruises for 500–1500 dbar are shown in Fig. 3*a* to highlight the depths, vertical extents and interesting nature and magnitude of the temperature perturbations. Some occur as deviations or shifts in temperature (and salinity) with respect to surrounding profiles, without marked temperature inversions: e.g. station 23-6 shows a high shift of 0·5°C at 1180 m. Others show multiple temperature inversions; e.g. station 17-6 from 700 to 1200 m. Temperature, salinity and corresponding temperature–salinity (T–S) curves are shown in Figs 3*b*–3*f* for various areas of the south-western Pacific.

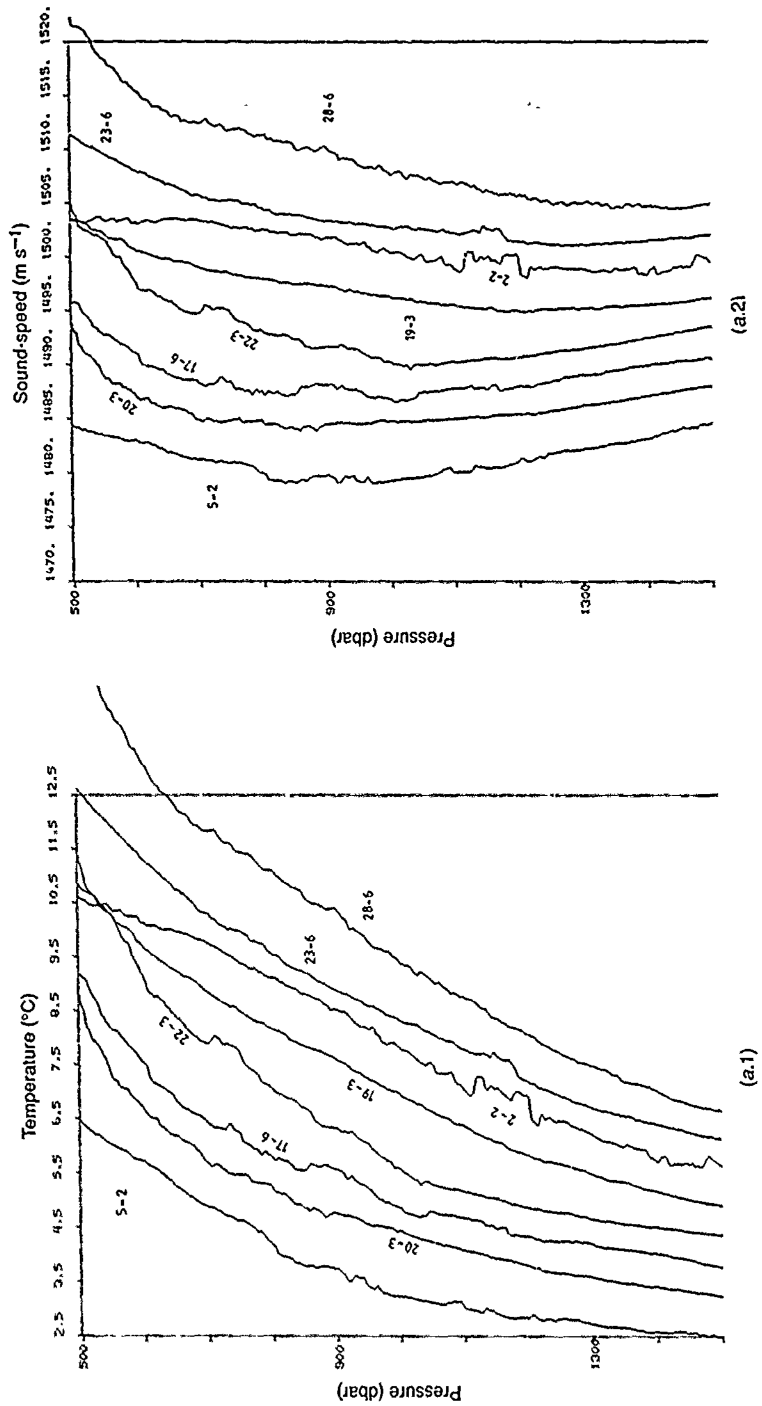
Some of the major types of effects seen are now briefly pointed out as an introduction to the analysis. North of Chatham Rise, station 1-2 (Fig. 3*b*) shows a pronounced intermediate salinity *maximum* at 1000 m, the level where the AAIW salinity minimum is expected to be found. South of Chatham Rise, station 2-2 (Fig. 3*b*) shows comparatively large and sharp temperature inversions of up to 0·3°C deeper than 1000 m. Station 10-3 in the Norfolk Basin (Fig. 3*c*) shows a cooler local salinity minimum shallower than the major minimum of the AAIW; station 12-3 shows a linear salinity profile above the salinity minimum. Station 17-6 (Fig. 3*d*) shows remarkable temperature inversions over a 500-m vertical interval from 700 to 1200 m.

The perturbations generally occur about the depths of the salinity minimum and density level associated with the AAIW mass (e.g. Wyrtki 1962*a*). AAIW forms by mixing below the surface in the Antarctic Polar Frontal Zone (e.g. Kuksa 1979), sinking between this zone and the Subtropical Convergence, then moving northward, the core being marked by a salinity minimum on the 27·1 sigma-*t* surface (Johnson 1973). Perturbations at some sites appear clearly in the T–S curves (Fig. 3) as intrusions or interleavings of water masses of higher or lower salinity at the level of the AAIW (see, for example Neumann and Pierson 1966 for a description of the use of T–S curves). Which of the water masses is the intruder can be found by comparison with other profiles. As a first note, it should be mentioned that AAIW is the only water mass at this density level that has been recognized in the southern Pacific away from the equator.

General Circulation of Antarctic Intermediate Waters

Since the perturbations have been identified as being principally associated with the AAIW mass, the circulation of this water is examined to see it if can explain their origin. Some specific comments on the effect of the East Australian Current on the flow of the AAIW in the Tasman Sea are made in a later section. The distribution of salinity described by various researchers at or near the core of the AAIW is shown in Figs 4*a*, 4*b* and 4*c*. Other such maps can be found in Rochford (1960*a*) and Ridgway *et al.* (1979). The latter authors also show salinity values over the Chatham Rise that are too high to be core values of the AAIW.

Reid (1973, 1986) and Johnson (1973) generally describe intermediate flow for the southern Pacific in terms of an ocean-scale anticyclonic gyre, with flow northwards west of the South American coast, westwards at equatorial latitudes, then flowing across the Pacific to return via a southward boundary current along the Australian coast, with eastwards flow across the Tasman Sea and north of New Zealand. Several closed gyres or recirculations are also present. Johnson (1973) used acceleration potentials at the density level of the AAIW, relative to 2500 m. Reid (1986) derived flow fields for various pressure levels by adjusting steric heights to take into account both baroclinic and barotropic flow in an attempt to derive absolute flow fields (Figs 4*d* and 4*e* show the south-western portion of Reid's maps). In the south of the survey area, Reid's fields for 1000 dbar are close to the


Sound-speed (m s^{-1})
1470. 1475. 1480. 1485. 1490. 1495. 1500. 1505. 1510. 1515. 1520.
Pressure (dbar)
500
900
1300
28-6
23-6
2-2
19-3
22-3
17-6
20-3
5-2
(a.2)
Temperature (°C)
2.5 3.5 4.5 5.5 6.5 7.5 8.5 9.5 10.5 11.5 12.5
Pressure (dbar)
500
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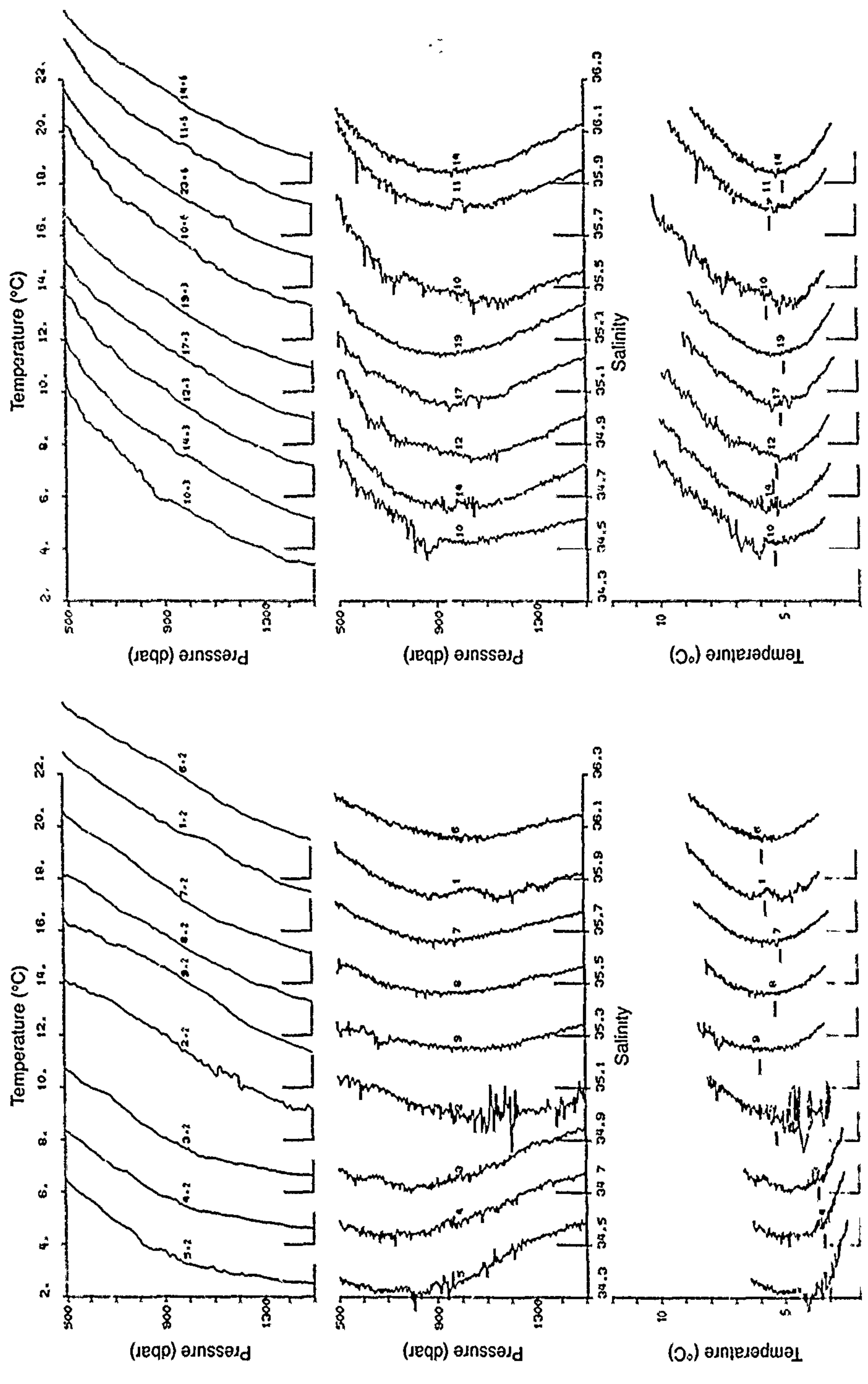
Temperature (°C)
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Salinity
Temperature (°C)
(c)
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Pressure (dbar)
Salinity
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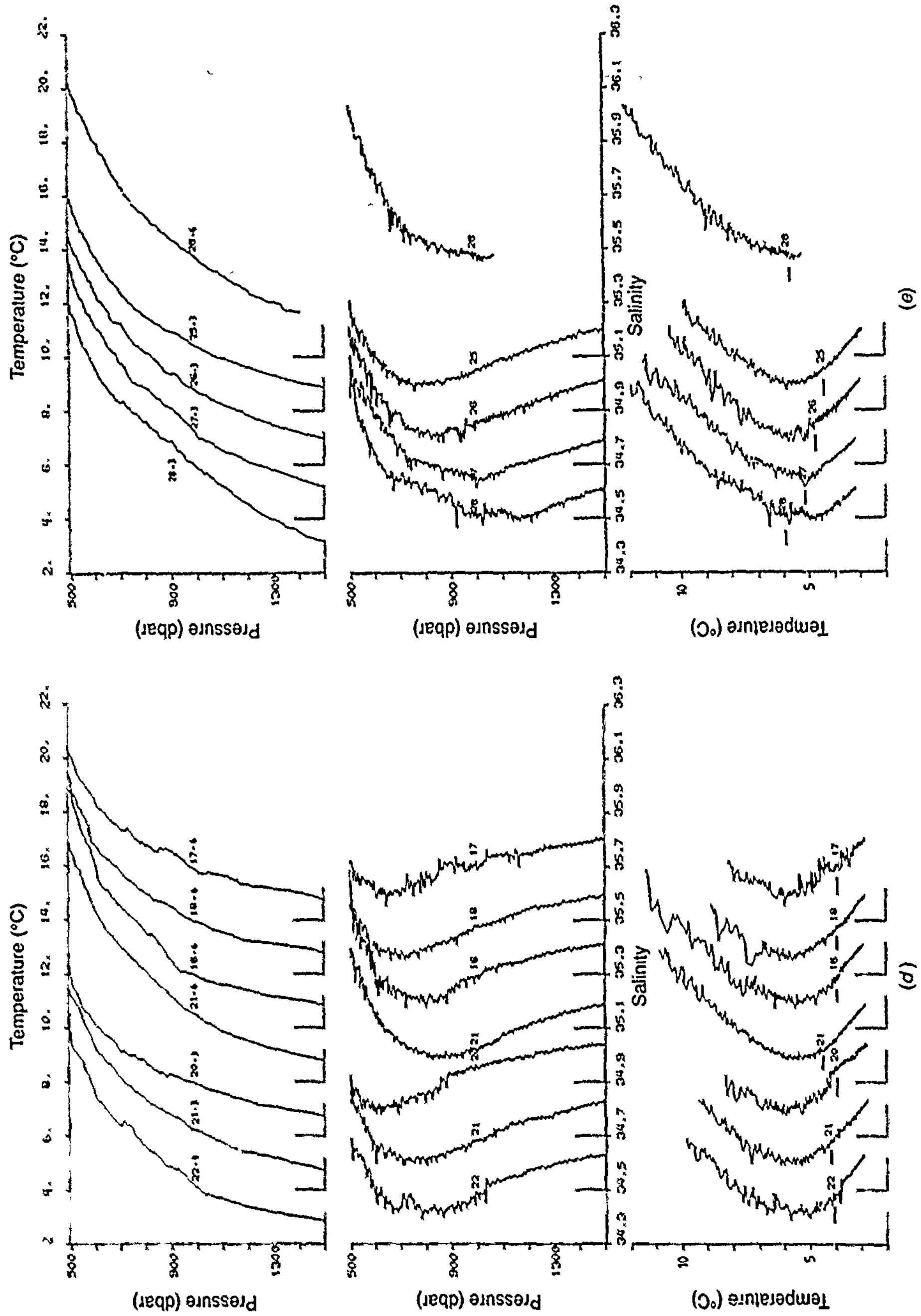
(b)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Salinity
Temperature (°C)
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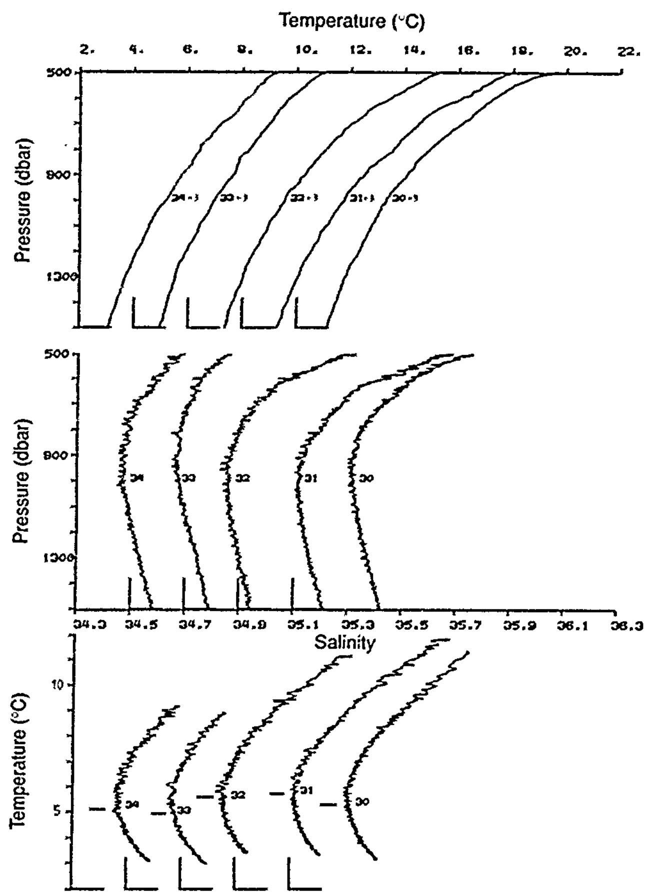
(e)



(*f*)

Fig. 3. Salinity, temperature and sound-speed profiles for CTD stations in the south-western Pacific, with associated temperature–salinity (T–S) curves. See Fig. 1 for station locations. In *b–f*, the temperature profiles are successively offset by 2°C, the salinity and T–S curves by 0·1 in salinity. In *a*, the offset is 0·5°C for temperature and 2·5 m s^{-1} for sound speed. The small horizontal bars on the T–S curves mark 1000-dbar pressures. (*a*) Selected stations for 500–1500 dbar. The trace for station 19–3 is included as an example of an unperturbed profile, while the others exhibit varying degress of temperature inversion. The sound speeds were measured by an independent sensor and are seen to show the structure of the perturbations to the same degree as the temperature sensor. Sound-speed precision is 0·05 m s^{-1}. (*b*) Stations north and south of Chatham Rise. Note the intermediate-depth salinity maximum in station 1–2 and the large deep temperature inversions in station 2–2. Stations 8–2, 7–2 and 6–2 are unperturbed. (*c*) Stations north of New Zealand. Note the sharp local salinity minimum in station 10–3 and the local intermediate salinity maximum and accompanying temperature inversion in station 11–6. Stations 19–3 and 14–6 are unperturbed. (*d*) Stations from Samoa to Fiji. Stations 17–6 and 20–3 show temperature inversions over a large vertical interval, while station 22–3 has two intermediate salinity minima. Stations 21–3, 21–6 and 18–6 are unperturbed. (*e*) Stations north-west of Norfolk Island. Stations 27–3 and 28–3 show inrregularities about the intermediate salinity minimum, with station 28–6 on Lord Howe Rise having a sharp bottom thermocline. Station 27–3 shows a linear salinity profile from 700 to 1000 dbar. Station 25–3 is unperturbed. (*f*) Stations in the Tasman/Coral Seas. The salinity and T–S curves between Lord Howe Rise and Australia are smooth and unperturbed at intermediate levels.

core level of the AAIW, and in the north the 500-dbar level can be used. More than one level is considered since the AAIW rises near the equator as part of the dynamics of flow of the Pacific gyre (e.g. Johnson 1973). Use of acceleration potentials (at the density level of the AAIW) relative to a suitable reference surface removes the need to consider more than one level. However, Reid's (1986) methods appear to be more consistent than other treatments.

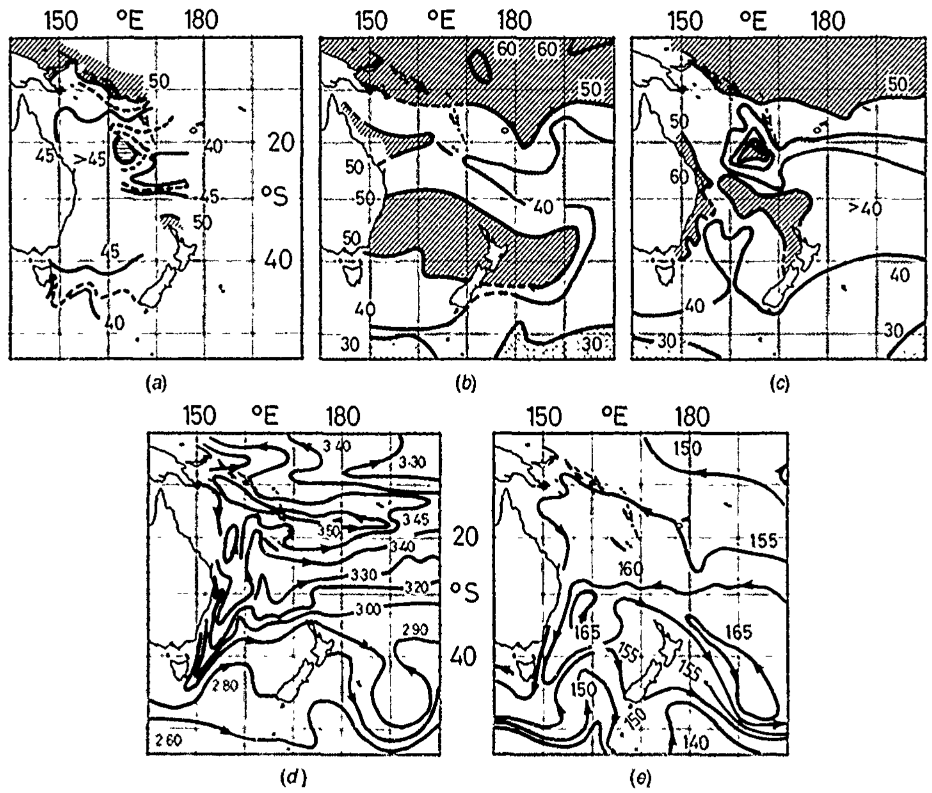


Fig. 4. (*a* and *b*) Salinity of the core layer of the AAIW in the south-western Pacific (*a*, after Wyrtki 1962*a*; *b*, after Johnson 1973). (*c*) Salinity on the isopycnal defined by sigma-0 of 27·28 (after Reid 1986). This isopycnal lies near 1200 m at 40°S and near 800 m near the equator. Salinity is shown as 100 (S-34). Stippled areas, salinity less than 34·40; hatched areas, salinity more than 34·50. (*d*) Adjusted steric height (representing absolute flow fields) of the sea surface (Reid 1986); units are 10 J kg^{-1} (or 10 m^2 s^{-2}). (*e*) Adjusted steric height of the 1000-dbar surface (Reid 1986); units are 1000 J kg^{-1}. The core layer of AAIW is found at 1000 m, on the average, in mid-latitudes. Plots (*d*) and (*e*) can be compared to find areas of similarity for the surface and 1000-dbar flow regimes.

Wyrtki (1962*a*), using the method of core analysis (Fig. 4*a*), describes two branches of AAIW in the Tasman/Coral Seas. One branch enters between Tasmania and New Zealand from the south, having salinities below 34·40, but with salinity increasing rapidly northwards with 34·45 exceeded near 40°S. Another branch enters from a strong northward flow of AAIW around the Chatham Rise east of New Zealand, also with salinities below 34·40. This branch moves westward between New Zealand and Fiji, splitting about New Caledonia. Depth of the AAIW ranges from about 1000 m in the Tasman Sea to less than 700 m at 20°S. Wyrtki's (1962*a*) descriptions are based on data from widely spaced Nansen stations taken over 1959 to 1961 for summer. Wyrtki (1962*b*) describes AAIW inflow to the west across 180° of longitude from 10–30°S at the 700 m level, with much weaker flow at

1100 m. The later studies of geostrophic flows using all available data (Reid 1986), and of acceleration potentials at the level of the AAIW (Johnson 1973), generally support Wyrtki's (1962*a*, 1962*b*) findings, though the data distribution in many areas is often sparse so that descriptions represent broad climatological averages. Rochford (1960*a*, 1960*b*) studied intermediate waters, using oxygen and salinity-phosphate relations for data from 1928 to 1959, for sigma-*t* surfaces 26·80 and 27·20 for 10°N–55°S, 140–180°E, also for a sparse data set. Qualitatively, the patterns of Rochford (1960*a*, 1960*b*), Wyrtki (1962*a*, 1962*b*), Johnson (1973) and Reid (1986) agree, but details remain undefined. Rochford (1960*a*) also identified a third inflow of intermediate water entering the Coral Sea from the north-west and north of New Guinea, based on scant data. Rochford (1960*a*) (and perhaps Johnson 1973; Fig. 4*c*) shows the Pacific entry from the east to move north of New Caledonia, not to split about it, in terms of the position of the low salinity tongue arriving from the east.

Possible Formation Mechanisms for Temperature Inversions and Salinity Reversals

Topographic Interactions and Isentropic Penetration

Since many perturbations are found near ridges (Fig. 1), this suggests immediately that the perturbations could arise directly from topographic influences on the flow of the AAIW without other dynamical influences being directly involved. Tongues of different horizontal and vertical extents could occur as isolated intrusions extending through gaps in the ridges and intruding into water masses with different properties on the other side. Since the AAIW in the northern and eastern parts of the south-western Pacific generally moves to the north and west (Wyrtki 1962*a*; Johnson 1973; Reid 1986), such a mechanism would cause perturbations to be seen north and west of ridges and island arcs, where many do occur (Fig. 1). For example, two low-salinity intrusions of AAIW moving between ridges into a higher-salinity area would lead to the appearance of two local salinity minima, with the previous minimum then appearing as a local maximum. (A single intrusion of waters into a lower-salinity area could give the same effect. Comparisons must be made with nearby unperturbed profiles to find which case applies.) The ridges mentioned earlier have a vertical extent well above the salinity minimum of the AAIW, but they also have many gaps allowing throughflow of waters at the depths of the AAIW.

Perturbations could similarly arise because of splittings of flow of the AAIW into different paths around obstacles, each path being subject to different mixing conditions. For example, a northward movement of AAIW on the eastern side of a ridge looping back on the western side could meet recent throughflows or flows that passed south of the ridge. This mechanism potentially leads to path differences of hundreds to thousands of kilometres. If the flows experience different degrees of mixing over the paths, they could acquire significantly different properties and T–S signatures while still being found near the same density level, allowing isentropic penetrations.

It is principally intermediate-depth temperature inversions that are discussed here since they are obvious signs of water-mass interactions and since the temperature sensor was not subject to the shifts experienced by the conductivity sensor. Jarrige (1973) shows how isentropic penetration can lead to temperature inversions, and he found examples of this mechanism for equatorial waters at depths of 150–200 m. Jarrige's (1973) examples are for layers thinner than 15 m, where the temperature inversion does not exceed 1°C. A strong positive vertical salinity gradient is necessary for temperature inversions to form (depth taken positive downwards).

Advection

Jarrige (1973), using the methods of Stommel and Federov (1967), also discusses how temperature inversions can be caused by advection of thin horizontal laminae between two water masses with different salt contents. He was apparently able to verify the hypothesis of Stommel and Federov for shallow equatorial water examples. The theory applies to

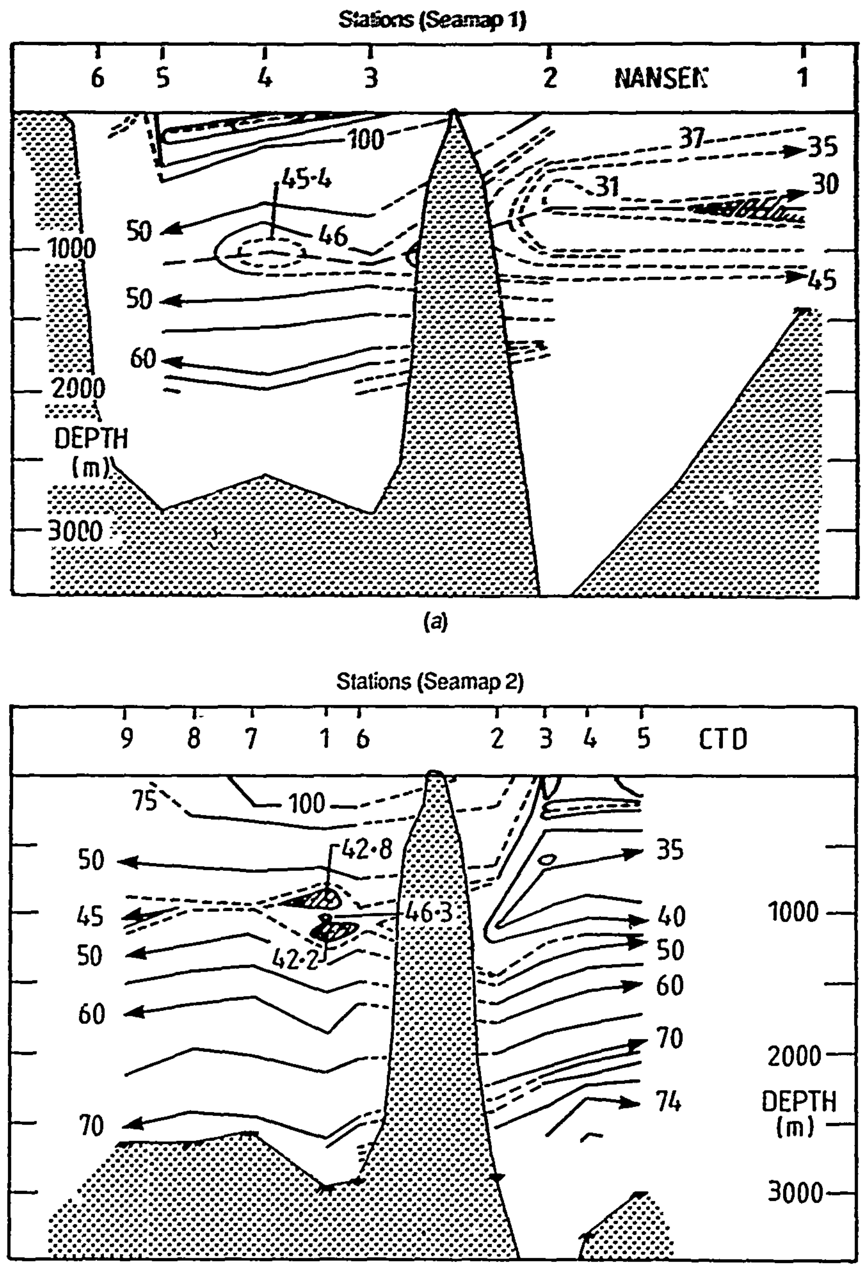


Fig. 5. Salinity cross-sections about Chatham Rise: (*a*) cruise Seamap 1 (February 1984), Nansen data; (*b*) cruise Seamap 2 (24–30 August 1985), CTD data. See Fig. 1*c* for station locations for Seamap 2. The Seamap 1 stations lie in approximately the same positions as the Seamap 2 stations. The Subtropical Convergence is seen near station 2-1 for Seamap 1 and between stations 2-2 and 3-2 for Seamap 2. The bottom is shown stippled, with Chatham Rise being the elevated feature in the centre of the sections. High intermediate-depth salinities are seen north of Chatham Rise to the west.

dimensions of 2–20 nautical miles (4–37 km) horizontally and ?–40 m vertically. The velocities of the water masses are not discussed, but interactions of one water mass with another along fronts subject to meandering behaviour or jets might lead to enhancement of this process over that expected from more passive entries. In particular, one water mass might capture parts of another along fronts.

Other Mechanisms

Jarrige (1973) also thought that some shallow equatorial temperature inversions might be caused by convergence of waters in eastward flows, perhaps without salinity increases with depth being necessary. The potential of water masses to form temperature inversions is discussed later, using the descriptions of Federov and Belkin (1984), to explain their general absence in the central Tasman.

Detailed Results for Various Parts of the South-western Pacific

In this section, the mechanisms for the perturbations found in various areas are generally given *a priori*, and supporting evidence is then briefly discussed.

North of Chatham Rise (Fig. 3*b*)

Some stations north of the Chatham Rise showed perturbations for the one CTD cruise made in this area (Seamap survey 2, Fig. 1*c*), but others did not. In particular, station 1–2 shows a local salinity maximum at about 1000 m, whereas eight other stations north and south of the rise generally show the expected salinity minimum of the AAIW. The origin of this local maximum is not easily defined. As a first note, stations 9–2 to 1–2, which are north of the Chatham Rise, have high-salinity core AAIW values of 34·45–34·46. These high values are expected to arise from a high-salinity branch of AAIW from the Tasman Sea that flows from north of New Zealand along the east coast of North Island (East Auckland Current; e.g. Heath 1985). This interpretation is taken from Wyrtki (1962*a*, 1962*b*), Heath (1972, 1985), Johnson (1973), Kuksa (1979) and Reid (1986) (Fig. 4*e* herein). The high salinity values found north of Chatham Rise (Fig. 5) can only come from north and west of the Rise according to the data in these references. Moreover, salinity cross-sections (Fig. 6) show that the western branch of the AAIW north and west of Lord Howe Rise has similar or higher values than the AAIW north of Chatham Rise (over 34·45) but that the eastern branch has core salinities of 34·35–34·40, only increasing to 34·43 when the western branch is met east of Norfolk Ridge, confirming the Tasman Sea origin of the higher-salinity waters. The presence of the two local minima at station 1–2 in a section having high core values implies that the lower-salinity local minima in station 1–2 are the signatures of the stranger water masses, but this is not necessarily the case. The local salinity minimum in station 1–2 is as low as 34·422, and the local maximum is 34·463. The shape of the isohalines in Fig. 5*b* at about 1000 m does indicate that the lower-salinity minima are forcing the isohalines apart, which is also seen in the isotherms (not shown). However, the isohaline shape could also be construed as a low-salinity water column being intruded by higher-salinity waters.

Sea-surface temperature contours, XBT and CTD temperature and salinity sections, and geostrophic-current calculations show the higher-salinity and -temperature surface waters of station 1–2, and the deeper waters, coming from a deeply penetrating warm-water meander looping from the north between stations 7–2 and 6–2 (Figs 2*a* and 5*b*). The temperature cross-sections are shown in Hamilton and Boyle (1990). The surface geostrophic-current component relative to 2000 dbar between stations 1–2 and 6–2 is 7 cm s^{-1}, and at 1000 m is 4 cm s^{-1}, to the north, with similar values to the south between stations 1–2 and 7–2 and with current values generally monotonically decreasing to the lowest common depth for station pairs of over 2500 m. A very slight local current maximum is seen for 890–1140 m between stations 1–2 and 6–2 that coincides with the depth of the local salinity

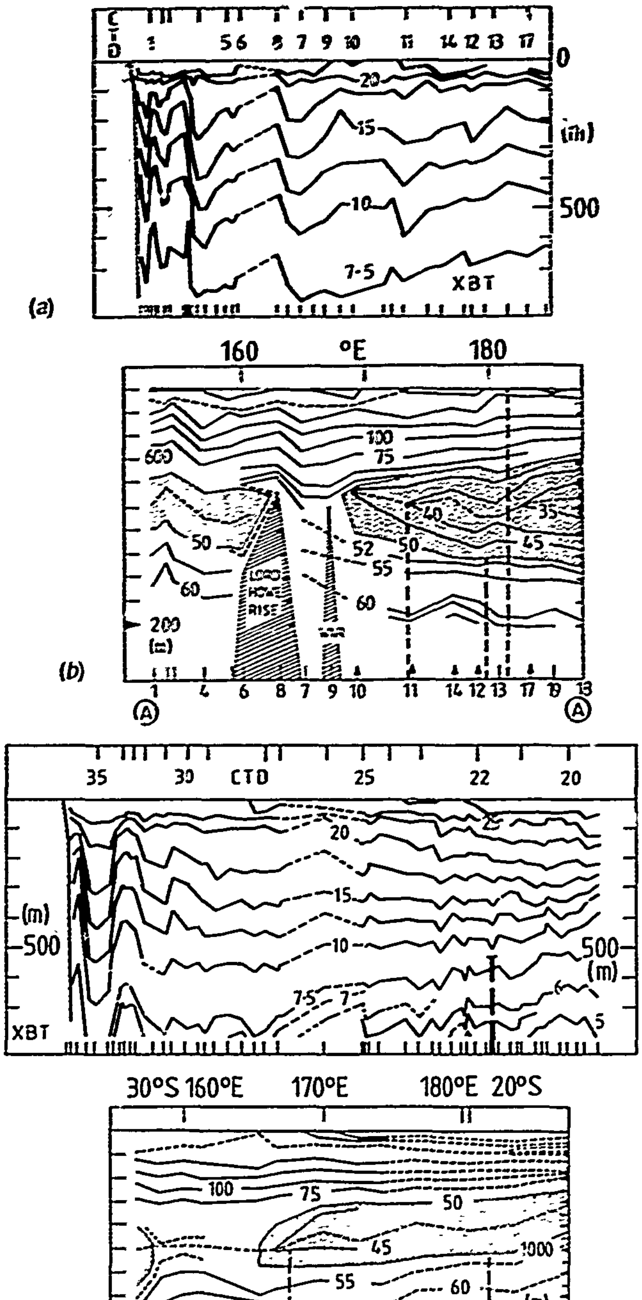
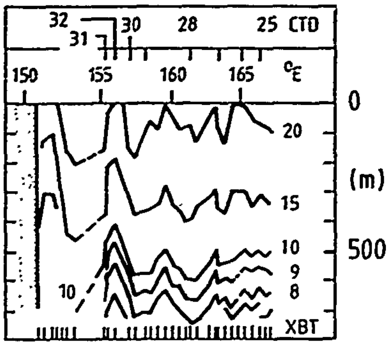
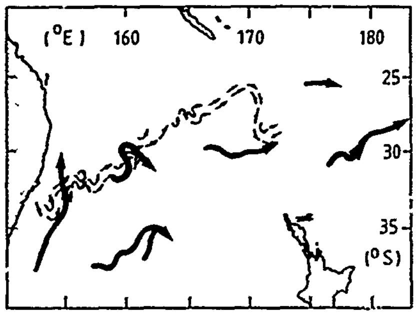


Fig. 6. CTD salinity cross-sections and XBT temperature sections for two transects (A–A and B–B in Fig. 1) from Sydney to near 170°W. Salinity is shown as 100 (S-34). Temperature and salinity sections have different depth scales. (*a*) XBT section from Sydney to 30°S,170°30′W in summer 1986 (A–A). Warm core eddies or meanders are located on stations 4-3, 7-3 and 11-3. (*b*) Salinity section from Sydney to 30°S,170°30′W in summer 1986 (A–A). The stippled areas show two branches of AAIW separated by Lord Howe Rise. The thick vertical dashed lines near stations 11-3, 12-3 and 13-3 are The Three Kings, Colville and Kermadec Ridges respectively. WNR, West Norfolk Ridge. (*c*) XBT section from Samoa to Sydney in summer 1986 (B–B). Eddies or meanders of the East Australian Current are sited on stations 35-3, 31-3, with a marked subsurface depression of isotherms west of station 28-3 below 700 m situated to the east of a channel through Lord Howe Rise. (*d*) Salinity section from Samoa to Sydney in summer 1986 (B–B). The dashed salinity contours for stations 20-3 to 24-3 are poorly calibrated, with only the depth of the salinity minimum being known absolutely.



(e)



(f)

Fig. 6 (*cont'd*). (*e*) XBT section from Sydney to 25°S,170°E in winter 1988 (B–B). Several warm core features are seen to extend to at least 700 m. (*f*) Surface flow patterns for the XBT section of (*e*). Thick lines, drifting buoys; thin lines, surface flows inferred from the XBT section.

maximum. The source of the lower-salinity waters in station 1-2 must now be defined, and it is possible for them to come from either the north or the south. A source of low-salinity core AAIW from the north is described by Wyrtki (1962*b*), Ridgway (1970) and Heath (1972), and its path can be seen as a recirculation in Reid (1986) sited east of New Zealand (Fig. 4*e*). Johnson (1973) and Kuksa (1979) also show such a recirculation, but their flow patterns are not well defined. Johnson's (1973) meander shows clockwise circulation around Chatham Rise, which does not accord with present knowledge. A second possible source is for the lower-salinity waters to come from the south, including south of the Subtropical Convergence. The lower-salinity waters could therefore have been advected by the current meander on either its northern or its southern side. Alternatively, *the local salinity maximum could be intruding into a lower-salinity area, as suggested by the slight local current maximum, with the low-salinity waters originating from the north as a meander in the western side of the recirculation*, as suggested by the geostrophic-current directions. Without more information this situation cannot be clarified, but the second scenario seems more consistent with the data.

A third possibility is that the salinity profile is caused by low-core-salinity waters overriding waters below. The meander appears to extend considerably below the depth of the local maximum, however, as seen in Fig. 5*b* for example, so this possibility is not favoured.

It is interesting to note that Reid's (1986) adjusted steric-height maps (Fig. 4*e*) with the recirculation pattern east of New Zealand possibly explain, or are in part verified by, the pattern of the AAIW salinity minimum seen by Ridgway (1970) north-east of East Cape (37°30'S,178°30'E) in summer 1965. The lowest-salinity AAIW waters (core value less than

34·40) are shown coming from the north across 34°S,176°W then apparently moving to the south-west. The comparable AAIW patterns shown by Heath (1972) can be similarly explained.

Several other maxima and minima in salinity (e.g. those in station 8–2 at 500–600 m and in station 9–2 at 500–700 m) possibly indicate water masses other than the AAIW, but these are not discussed in detail here. Station 9–2 has the lowest surface salinity (34·67) for stations north of the rise (the others range from 34·96 to 35·12, while those south of the rise range from 34·48 to 34·90), indicating that it may be sited in a northward surface extension of the Subtropical Convergence running up the coast (e.g. Stanton 1973). The main surface expression of the convergence is sited south of the rise and runs parallel to it (Fig. 2), as seen in satellite data from the Royal Meteorological Centre (RMC), Wellington. The structure of the convergence at the time of the Seamap 2 cruise is discussed further in the next section for data south of the rise.

South of Chatham Rise (Fig. 3*b*)

Perturbations were seen in all Seamap 2 stations south of the Chatham Rise, with those in station 5–2 and especially station 2–2 showing relatively large multiple temperature inversions of approximately 0·3°C at depths of more than 1000 m. An XBT section between stations 2–2 and 4–2, and sea-surface temperature contours (Hamilton and Boyle 1990), show the Subtropical Convergence (STC) to lie between stations 2–2 and 3–2 (see Fig. 1*c* for locations), associated with a surface geostrophic-current component to the south of 17 cm s^{-1} relative to 2000 dbar between stations 2–2 and 3–2, with southward flow at 1000 m of 8 cm s^{-1}. Surface current between stations 3–2 and 4–2 is much lower at 6 cm s^{-1} to the south, and at 1000 m is about 2 cm s^{-1} south. Satellite-derived sea-surface temperature contours from RMC Wellington for August 1985 (Fig. 2*b*) confirm that this is the Subtropical Convergence by the presence of a front running from south of New Zealand up the east coast of South Island (the Southland Front) and turning east south of the Chatham Rise to run parallel to the rise. Several short XBT sections (Hamilton and Boyle 1990) confirm the subsurface expression of the surface front. A weaker front lies north of the rise, and another (possibly the East Cape Current; e.g. Stanton 1973) runs from 40°S,177°E to 43°S,179°E where all three fronts converge and continue east. This interesting surface pattern suggests that the STC has a double structure, with one front south of the rise and a slightly weaker frontal set north of the rise. Stanton (1973) shows the STC over the rise as a broad mixing zone. From a study of historical data, Jeffrey (1986) interprets the STC as being associated with two weak surface salinity fronts with values of about 34·7 and 35·1 north and south of the rise respectively, but he did not examine temperatures since he thought they could not be used to show the position of the STC. According to Jeffrey (1986), this double structure is also seen in the Tasman Sea, except near Tasmania where the fronts merge and are relatively fixed in position. Stanton and Ridgway (1988) found two frontal zones in the Tasman Sea for October/November 1977 but noted that the northern front was not part of the STC if the front is defined as a water-mass boundary. Wyrtki (1960) surmised that the position of the STC would not be stationary but would fluctuate in response to general weather conditions. The convergence could be formed by several strips in which convergent movements take place rather than occurring as a continuous frontal feature.

The perturbations in stations 2–2 and 3–2 are apparently caused by relatively higher-salinity AAIW from north of the convergence meeting along the subsurface expression of the Subtropical Convergence with more recently formed AAIW from the south. The current speeds suggest entrainment or advection as the actual mechanism. We thus again have the situation of recognizable components of the same water mass interacting after one or more of the branches has been diluted by other waters. Overplots of T–S curves (not shown)

place the T–S curve of station 2–2 midway between a grouping of stations 3–2, 4–2 and 5–2 and another group of stations 6–2, 7–2 and 8–2 having higher temperature and salinity. The salinity excursions in station 2–2 at temperature inversions range between these two groups, as expected. Salinity profiles show that the salinity minimum of station 2–2 (in the absence of the high-salinity excursions) is 300–400 m deeper than for stations of the southern grouping; i.e. the salinity minimum deepens from south to north across the convergence, as seen in salinity cross-sections (Fig. 5), as the AAIW sinks to its density level.

However, some of the perturbations south of the Chatham Rise, particularly those south of the Subtropical Convergence, are not expected to arise solely from such current interactions. The perturbations here are also likely to be related to the mode of formation of the AAIW itself, with waters forming and sinking at different areas and times in the Antarctic Polar Frontal Zone. This simply means that the AAIW in this area is not yet a fully developed water mass with well defined properties acquired by mixing after leaving the formation area. The Subtropical Convergence, associated with the northward extent of the formation zone of the AAIW, undergoes north–south movement in this area during the year, indicating a changing environment in the formation area (e.g. Wyrtki 1962*a* and sea-surface temperature contours derived by RMC Wellington). The perturbations at station 5–2 may be caused in such a manner since calculated current components of southward flow relative to 2000 dbar between stations 5–2 and 4–2 are low, being less than 2 cm s^{-1} at the surface and 1000 m, and since subsurface fronts are not present in the XBT section. Deeper perturbations from 900 to 1350 m in station 3–2 lie below the salinity minimum and reflect mixing with the water mass below. The *Eltanin* continuous STD profiles show similar effects at intermediate and other depths south of the STC and in higher latitudes where water masses are known to form, as seen in meridional sections of various researchers such as Wyrtki (1962*a*).

North of New Zealand (Fig. 3*c*)

Perturbations are seen in stations north of New Zealand from east of Lord Howe Rise (165°E) to 177°30′W (east of Kermadec Ridge) but not farther west along the Seamap tracks (Fig. 1). The Kermadec ridge system leads to the perturbations at stations 10–2 (profile not shown) and 17–3 by causing deflection of westward AAIW flow to the south to meet eastward throughflow at this level from the Tasman Sea associated with the East Australian Current. This interpretation is taken from the adjusted steric-height maps (Fig. 4*e*) of Reid (1986). Note that in the southern hemisphere, in order to conserve vorticity, a reduction in ocean depth deflects westward flows to the south, while an increase in depth produces a consequent northward deflection.

The Tasman Sea outflow is expected to be responsible for some of the other salinity reversals north of New Zealand in a similar manner; i.e. *the perturbations could arise from dynamically forced confluences of different branches of the AAIW.* Evidence for such a mechanism is seen from temperature and salinity sections and geostrophic-current calculations for Seamap cruise 3. For example, the cause of the perturbations at station 10–3 (Fig. 3*c*) is the meeting of higher-salinity AAIW waters, transported to the east from the Tasman/Coral Seas by the East Australian Current (EAC), with lower-salinity waters of AAIW arriving from the east. Station 9–3 also shows some small effects but does not reach 1000 m. Stations 9–3 and 10–3 lie on the eastern side of a warm core feature seen in XBT and CTD temperature cross-sections to extend to at least 800 m (Fig. 6*a*). The warm core feature appears as a meander in the Tasman Front. A salinity cross-section (Fig. 6*b*) shows that the western extent of the branch of AAIW from the east on the section is terminated between stations 9–3 and 10–3, where the 34·45 and 34·50 contours become closed. Salinity contours follow the trend of temperature contours in the warm core feature at these depths, with highest salinities at the depth of the AAIW seen at adjacent stations

7–3 and 9–3. The eastern AAIW branch is apparently prevented from travelling farther west here by the combined effects of the West Norfolk Ridge and the warm core feature, which acts as a dynamic boundary, at least on the upper part of the AAIW. The eastern extent of the deeper flow of the higher-salinity western branch is obstructed below 900 m by the Lord Howe Rise, with the EAC then looping north over the rise. The effect of the meeting of the eastern and western waters can also be seen in the steepening of both salinity and temperature contours below 700 m on the eastern side of the warm core feature. This could promote advection of the eastern AAIW branch northwards by the warm core feature. Reid (1986) shows a westward flow in this area at latitude 28°S and an eastward flow at latitude 32°S, which are close in terms of his data spacing (Fig. 4*e*). Meandering of these flows, or crossflow from the south, could lead to interactions. Johnson (1973) shows westward flow north of 30°S, but flow north of New Zealand is undefined, while a speculative cyclonic gyre in the central Tasman seems to need revision.

Perturbations in stations 11–3/10–6 (same site for summer and winter) east of Three Kings Ridge can be similarly explained by current interactions. An XBT section for a summer 1986 survey (Seamap cruise 3, Fig. 6*a*) shows a warm core feature on the eastern side of Three Kings Ridge extending to the XBT limit of 750 m. An XBT section for a winter 1987 survey (Seamap 6) (see Hamilton and Boyle 1990) shows a warm core feature to at least 750 m on the western side of the ridge. Neither section is complete enough to show if the warm waters seen on both sides of the ridge are connected by a front looping north over the ridge, but this is expected from the dynamics involved through which eastward-moving waters in the southern hemisphere are constrained by Coriolis effects and shallowing bottom depth to loop north over ridges and then back south. The depth of the salinity minimum is 950 m for Seamap 3 and 1000–1150 m for Seamap 6. Station spacing is too large to adequately resolve by geostrophic calculations the current structure shown in the XBT section, but the perturbations are again favoured to be caused by forced confluences of high-salinity water transported from the Tasman Basin with lower-salinity water from the east. The northern parts of a loop over the ridge could interact with the westward flow of the AAIW shown at these latitudes by Reid (1986). The depth of the salinity minimum in Fig. 6*b* in the east of the section shows vertical displacements, indicating different arrivals or dynamic influences, and the displacements show good correlation with ridge positions. These vertical displacements are accompanied by depressions in isotherms, showing the influence of the warm core features at depth in the east of the section also (Figs 6*a* and 6*b*).

As a passing note, the cooler lower-salinity eastern branch of the AAIW can often be picked up quickly by plotting the depth of the salinity minimum on temperature cross-sections, without calibrated salinity values being necessary. For the Seamap 3 and Seamap 6 tracks north of New Zealand the western minimum usually occurs between 5 and 7·5°C (only 2·5°C contours have been used) but drops below the level of the 5°C contour when the cooler eastern branch is encountered. As mentioned earlier, the salinity profile sometimes becomes linear above the minimum, compared with the smooth rounded profile in warmer waters, when frontal areas are crossed (e.g. station 12–3, Fig. 3*c*). The linear part of the profile indicates mixing between two water masses, the cores of which lie at different depths (vertical mixing). For station 12–3, the mixing is between the warmer, more saline western branch of the AAIW with the cooler eastern branch. For the linear section to lie above the lower salinity minimum, the warmer core lies above the cooler core, either because the warmer waters do not attain the depths of the cooler core, or because the front slopes in the vertical plane, with warmer water overriding cooler, denser water.

South-west of Samoa and South-east of Fiji (Fig. 3*d*)

Perturbations were seen southward of Samoa (stations 20–3/17–6) and south-east of Fiji (stations 22–3/16–6) in both summer and winter but not at two sites in between

(stations 21–3 and 18–6). Station 18–6 does show a shift to higher temperatures between 450 and 600 m. The multiple temperature inversions in stations 20–3/17–6 indicate much mixing, but the cause can not be definitely established as the salinity profiles shown are uncalibrated and the historical data is sparse. Some useful observations can still be made, however.

Station 17–6 is much colder than 16–6, and 20–3 is much colder than 22–3, showing the first-named stations to be relatively farther north on the boundary of the southern Pacific anticyclonic gyre. The AAIW rises near the equator as part of the dynamics of flow of the gyre (e.g. Johnson 1973), making it necessary to consider upper levels as well as the flow patterns on the 1000-dbar level considered for mid-latitudes.

Reid's (1986) patterns for 500 and 1000 dbar would suggest arrivals in the north at these latitudes of AAIW and SubAntarctic Water from the west with a long travel path, and also of AAIW more directly from the south from flows with shorter travel paths, so that the two flows could have acquired significantly different properties. Similar patterns can be inferred from Johnson (1973) and Rotschi (1973). The shift to higher temperatures mentioned earlier for station 18–6 does suggest the presence of another intermediate water mass. *Meeting and vertical mixing of these flows seems a likely cause for the perturbations in association with dynamic uplift in the north of the southern Pacific gyre.*

However, both Johnson (1973) and Reid (1986) had trouble contouring flow patterns between 15°S and the equator because of the weak baroclinic field and sparse data, so flow directions at intermediate levels are uncertain in this region. However, it should be mentioned that, unlike the situation in the southern areas, surface currents are not expected to directly influence flow at the AAIW depth in tropical regions, where surface flows have limited penetration. Zhao (1983) found that the intermediate flow at 4°N to 10°S,170°E was not affected by surface conditions, based on water-mass analysis for two seasons. Wyrtki (1962*b*, fig. 7) found eastward flow south of Fiji to 100 m from 18–21°S, based on wide station spacing, with westward flow between 100 and 400 m, weakening to 700 m. Dynamic topography below 700 m was flat. XBT sections to 700 m for the Seamap summer and winter surveys show similar results.

North-west of Norfolk Island (Fig. 3*e*)

Stations 27–3/25–6 and 28–3/26–6 show perturbations from 700–1100 m and are situated west of the Norfolk Ridge in an area where Wyrtki (1962*a*) shows a tongue of the AAIW north of the highest part of the ridge. Johnson (1973) shows similar results, and the AAIW tongue can be traced from much farther east (Fig. 4*b*). The perturbations are smaller than those so far described, as can be seen in Fig. 3*a* for station 28–3. Rochford (1960*a*) shows AAIW to head north around eastern New Caledonia, not south of it, although some patterns for different intermediate waters are contradictory, due in part to the non-synoptic nature of his data.

A salinity section for summer survey Seamap 3 (Fig. 6*d*) shows the westward extent of the AAIW from the east to be halted between stations 27–3 and 28–3, where the 34·45–34·50 contours become closed on the west (although salinity is not well calibrated); i.e. salinity rises rapidly at 1000 m between stations 27–3 and 28–3, indicating a change in the salinity regime. Wyrtki (1962*a*) shows similar results for the area (Fig. 4*a*). For Seamap 3, a northward-moving current on the western side of the Norfolk Ridge, suggested in CTD isotherms from 700 to 1100 m, appears to act as the limiting influence to eastward AAIW movement, so the interaction of this current and the AAIW is likely to cause the perturbations. Contours from more closely spaced XBT drops (Fig. 6*c*) also suggest a northward current component below 600 m west of station 27–3 to the limits of the traces at 800 m, with isotherms continuing to plunge below this level. The dip between 700 and 800 m and deeper is pronounced, but it does not occur above 600 m with much intensity, a phenomenon also reflected in the more widely spaced CTD stations. There is insufficient

data to fully investigate this point, but this subsurface dip in the isotherms occurs east of the Lord Howe Rise and parallel with a channel of 1500–2000 m depth through the rise, the channel sloping from north-west to south-east. The feature could be interpreted as the effects of the channelling of a deep flow from the west through the passage in the rise that then loops south along the rise and is skewed in the vertical from north to south. The salinity section, however, indicates that some of the steepness of the dip on the eastern side may be directly caused by the meeting of the branch of the cooler AAIW from the east with warmer western waters, forcing depression of the eastern AAIW.

For Seamap 6, sea-surface temperature contours and an XBT section to 800 m (Figs 6*e* and 6*f*) show a broad, warm meander from 159 to 163°E, a warm meander about 60 nm wide west of station 26-6, and another warm meander between stations 26-6 and 25-6 (also shown generally in Fig. 2*a*). The frontal activity along the Seamap 6 track follows the 20°C surface isotherm and runs north-east from 30°S,160°E to 26°S,170°E then turns to the south-west. Drifting-buoy tracks for the period confirm that the surface isotherms show the surface flow directions very well (Fig. 6*f*). The XBT section (Fig. 6*e*) confirms the deep subsurface expression of the surface frontal patterns. The broad meander represents a warm feature on the eastern side of a northward extension of the Lord Howe Rise. The south-west to north-east trend in the surface pattern corresponds quite well with the adjusted steric height of the sea surface shown by Reid (1986), but he shows westward flow at the 1000-dbar level at the stations, which corresponds to flow directions of the AAIW that might be inferred from tongues of the AAIW shown by Wyrtki (1962*a*) (Figs 4*d* and 4*e*). Johnson (1973) shows a closed gyre in the Tasman that would generate eastward flow, or even north-eastward flow at the level of the AAIW from out of the Tasman here. Reid (1986) shows eastward flow farther south (south of 30°S) at the 1000-dbar level. This represents Tasman Sea outflow north of New Zealand and agrees with known flow patterns and those discussed in this analysis.

It appears that the perturbations north-west of Norfolk Island are caused by the lower levels of influence of an outflow to the north-east from the Tasman/Coral Seas meeting AAIW that is attempting to move to the west. This observation is further confirmed by the unexpected appearance of a sharp bottom thermocline in winter station 28-6 (made to within a few metres of the bottom) at 1300 m (Fig. 3*e*) that indicates strong current activity at this depth, assuming it is not formed by other causes. Wyrtki (1962*b*) does not show such an outflow for data for January–April (summer). Reid's (1986) surface patterns correspond to such outflow and, for 1000 m, show inflow along 30°S. The pattern of flow inferred in the present analysis is an AAIW inflow across 170°E north of about 28°S that may then be forced to the north by the dynamical boundary of the Tasman/Coral Sea north-eastern outflow. The flows inferred for AAIW by Rochford (1960*a*, fig. 3) generally show such a pattern, based on scant data, but do not agree with the present analysis in other areas. The surface outflow is shown by drifting-buoy data to be very broad, occurring at least between 25 and 30°S for 165–180°E. For times not coinciding with the present surveys, some buoys west of 160°E moved westwards at these latitudes, so flow patterns may be variable.

Western Tasman Sea—Temperature–Salinity Regime of the Tasman Front

The central Tasman forms a different case from other areas of the Seamap routes because perturbations were not generally found west of Lord Howe Rise despite the higher station density (Fig. 3f). Perturbations caused by the presence of Bass Strait waters down to about 600 m (Boland 1971) are excluded, not being related to the discussion that follows. Given the strong frontal areas in the Tasman and the fact that potential northern, eastern and southern sources of AAIW would be expected to have very different properties, the absence of perturbations at the level of the AAIW becomes as much a problem as their

presence initially was in other areas. Since perturbations were found in intermediate-depth frontal areas north of New Zealand, they might also be expected to be seen across the stronger Tasman Front and its eddies, where warm northern Coral Sea waters are traditionally shown meeting cooler Tasman Sea waters. Warmer waters on the high dynamic side of the front come from circulation of at least part of a Pacific Basin anticyclonic gyre and would be expected to have experienced very different mixing over the journey than over the much shorter path of the southern waters expected to come from between Tasmania and New Zealand.

The lack of temperature inversions has been noted by others (Hamon 1970; Federov and Belkin 1984). Federov and Belkin (1984) explained the general absence of perturbations in upper waters in the central Tasman, especially those involving temperature inversions, in terms of the peculiar thermohaline nature of the Tasman Sea frontal area. They attribute the paucity of temperature inversions in the East Australian Current/Tasman Sea fronts and eddies to the front being purely 'baroclinе': 'Isopycnal motions cannot create intrusions with temperature inversions . . . since isopycnals, isotherms, and isohalines are parallel in all cross-sections, and cross only isobars, with no temperature and salinity gradients in such fronts at sloping isopycnal surfaces'. Their comments apply largely to data for the upper hundreds of metres in the west of the Tasman Sea (30–35°S,150–157°E). In the terminology of Federov and Belkin (1984), the opposite case is 'thermoclinic', in which horizontal density gradients are zero because of the mutually compensating gradients of temperature and salinity at horizontal isopycnal surfaces. (This corresponds to the case of water masses of different thermohaline properties meeting on the same density level.) Federov and Belkin (1984) describe the majority of ocean fronts as occupying an intermediate position between these two extreme cases. According to them, the presence of thermoclinic structure in other fronts allows intensive fine-scale structure and temperature inversions, whereas the fine structure of the central Tasman is that of the stepped type. Their observations are confirmed and extended to deeper levels by the continuous CTD profiles discussed here.

The above situation arises because the thermohaline structure is practically identical on both sides of the Tasman frontal area, differing only in depth (Hamon 1961, 1970; Federov and Belkin 1984). This is not the case in other major oceanic fronts such as the Gulf Stream and Kuroshio. A closed eddy or ring spawned on the Gulf Stream front can be regarded as a 'stranger' water mass since it has very different T–S properties from the water around it (e.g. fig. 3 in Federov and Belkin 1984). The cause of the most unusual Tasman situation has attracted little comment in descriptions of the Tasman Front.

Much of the reason for the similar thermohaline regime can be attributed to the fact that, in one sense, the central to intermediate waters about the front do have a similar origin—the region of the Subtropical Convergence (e.g. Sverdrup *et al.* 1946). However, it appears that this can not constitute a full explanation in terms of the absence of temperature inversions and perturbations because such phenomena do occur elsewhere for waters with demonstrably this 'same' origin. The only remarks on the subject for the EAC area come from Hamon (1961), who comments that the uniformity of temperature–salinity curves for stations in a particular area is well known and is taken as evidence of mixing along surfaces of constant potential density. Such a method in this case requires large frontal crossflow in the presence of large shear and can not be favoured. It is more applicable to separate T–S regimes on either side of fronts. The East Australian Current does not originate in the Tasman Sea under wind or other influences, which would have provided a simple explanation, nor is it the passage of a wave, as for ripples on a pond (which is a good analogy in some respects to the frontal structure described), but the passage of a water body from the north.

It seems to this author that the causes of the particular thermohaline structure of the Tasman Front merit a good deal more investigation. Another, perhaps more dominant, cause other than waters originating about the STC may be the presence of waters on the low dynamic side of the front that actually come from the high dynamic side of the front.

This structure is shown in Fig. 7. Returns to the north-east from the southern branch along the coast lead to the northern waters south of the Tasman Front acting as a buffer between the warm northern waters of the main front and cooler southern waters. This broad interpretation, if correct, explains the observed thermohaline structure about the Tasman Front in terms of the Tasman Front as a zonal current embedded in weaker flow. There is a deal of evidence from ship, satellite and buoy data to support the surface structure in Fig. 7, but descriptions are left for other analyses since that is moving beyond the scope of the present investigations. In the context of the present analysis, Fig. 7 can be regarded as a partly speculative model that could explain some of the observed thermohaline structure associated with the main Tasman Front.

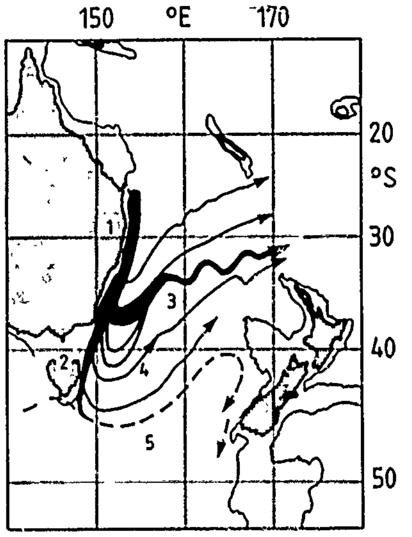


Fig. 7. Proposed model of the Tasman Front in the western Tasman to partly explain the similarity in temperature-salinity regimes north and south of the main Tasman Front (derived from various sources). The climatological patterns of Reid (1986) are similar, as are the patterns of Wyrtki (1960, 1962*b*). *1*, Main meridional East Australian Current flow along the Australian coast; *2*, EAC continuation to south of Tasmania; *3*, EAC branch (Tasman Front) weakening across the Tasman; *4*, weaker return flows from south of the main front, fed from the coastal continuation and the southern extension of the first meander and by mesoscale eddies spawned south of the Tasman Front; *5*, the Subtropical Convergence.

Central Tasman—Flow of Antarctic Intermediate Water

Wyrtki (1962*a*) found that the entry of the AAIW from the south into the Tasman Sea was poorly developed and thought that this might be related to the southward flow of the East Australian Current. By comparison, the AAIW east of New Zealand moves to 25°S or farther north, then moves westwards into the Tasman Sea. In the southern Tasman, it does not get much past 40°S. This requires the EAC to have significant influence to at least near the depth of the AAIW minimum of 1000 m in the southern Tasman Sea (discussed by Wyrtki 1962*a*). The depth of influence of the EAC between Australia and the Lord Howe Rise is being studied by Dr Mulhearn of the Maritime Systems Division (Sydney), Defence Science and Technology Organisation, using Seamap and other data. Initial observations (Mulhearn *et al.* 1989) are that the depth of influence of the EAC varies between 2000 m (as for Boland and Hamon 1970) and the bottom (well over 4000 m). Mulhearn *et al.* (1986) measured deep flows on the Tasman Abyssal Plain near Australia near 36°S,151–152°E at a depth of 4750 m that were well correlated to the surface flow of an eddy spawned by the EAC. Further, the geostrophic-current profiles formed between CTD station pairs across fronts associated with the East Australian Current are often monotonically decreasing from the surface to the bottom (deeper than 4500 m) or have no apparent level of no motion above 4000 m (Mulhearn *et al.* 1989), also indicating that the influence of the EAC in the western Tasman Sea extends deeper than the level of the AAIW.

The EAC meanders from the Sydney area to north of New Zealand, possibly interacting with the Lord Howe Rise and Norfolk Ridge (e.g. Stanton 1981). *Tangible evidence of EAC interactions with the bottom may be seen in the form of bottom mixed layers and bottom thermoclines in several CTD profiles on the Lord Howe Rise* (Fig. 1) *at depths hundreds of metres greater than the core of the AAIW at these locations.* Indications are that the influence of the EAC does extend to the depth of the AAIW, at least in areas west of and over the Lord Howe Rise and near the Australian coast. Recent data therefore do support Wyrtki's (1962*a*) hypothesis of entry from the south being lessened by activity of the EAC, at least in the western Tasman.

For data from only two stations—one near Tasmania and one near New Zealand—Wyrtki (1962*b*) postulates almost uniform and very weak outflow to the south between Tasmania and New Zealand, reaching to 1200 m and preventing the northward penetration of AAIW. Seamap Nansen data for a 1985 winter cruise from Sydney to south of New Zealand show that surface geostrophic currents away from and south-east of the EAC are about one-twentieth of EAC strength (Hamilton and Boyle 1990) relative to 600 m, implying that if AAIW is to penetrate the Tasman Sea the penetration should occur to the east, away from EAC influence. In the east, however, it is probable that both the shallow topography of the Challenger Plateau (Fig. 1) and the outflow associated with the STC along the western New Zealand coastline (Southland Current; e.g. Heath 1985; see Fig. 2 herein) hinder northward penetration of AAIW. Bottom mixed layers and thermoclines were found on the Challenger Plateau in February 1987 at bottom depths of 530–585 m and in August 1986 at a bottom depth of 850 m, and the depth of the AAIW salinity minimum west of the plateau is 900–1000 m. In crossing the Tasman Front from warm to cooler waters on the line from Sydney to Cape Farewell on the north-west of South Island, New Zealand, the AAIW salinity minimum in the Seamap data becomes colder, deeper and less saline south of 36°S and east of 160°E for 1986 winter CTD data and for Nansen survey TC1 of December 1983 (AAIW salinity of 34·40 against 34·45), which does show northward penetration of AAIW in the east on some occasions. Salinity contours for the core of the AAIW (Heath 1972) show an indication of northward penetration west of and along 160°E to about 43°S, with salinity less than 34·40 (see also Fig. 4*c*).

Although it does not seem to have been stated explicitly in previous work, the explanation for the location of the entry points of the eastern branch of the AAIW into the Tasman Sea being sited north of 30°S (e.g. Wyrtki 1962*a*; Johnson 1973) rather than farther south, nearer to New Zealand, is the eastward movement of part of the return flow of the East Australian Current, or, more correctly, of the outflow from the northern Tasman at all levels north of New Zealand. This movement hinders westward penetration of the AAIW from north of New Zealand to north of Norfolk Island and perhaps prevents it completely at these latitudes, at least on some occasions. This assertion is supported by the present analysis and by the surface and subsurface flow patterns of Wyrtki (1962*b*) and Reid (1986). It is the winter Seamap northern XBT section of Fig. 6*e* (along B–B, Fig. 1) that shows the strongest evidence of this outflow at depth in terms of subsurface frontal activity at the station sites. The flow of the AAIW inferred by Rochford (1960*a*) from sparse historical data south of New Caledonia is shown as northwards, which is the flow pattern inferred in the present analysis.

Discussion

Perturbations in temperature and salinity have been identified in the south-western Pacific Ocean at the level of the Antarctic Intermediate Water mass. Traverses of the same cruise track in different years and seasons confirm preferred areas of occurrence for the perturbations, generally in association with topographic relief, and the meeting of currents about these boundaries. Areas of perturbations can be expected to be associated with increased mixing of the AAIW with warmer subtropical water from the north and with other branches

of the AAIW. This is seen by the closure of salinity contours in some perturbation areas (i.e. in areas where salinity rises rapidly). The salinity of the AAIW east of 165°E does not rise gradually from south to north as usually described (e.g. Pickard and Emery 1982), at least not in some areas of the south-western Pacific, but is subject to stronger mixing at different areas of its path than in others.

The location of some of these mixing areas (e.g. those west of Norfolk Ridge, Fig. 1*c*), coupled with the scant dynamic topography measurements available, indicates two possibilities: (1) that some of the AAIW from the Tasman Basin may be recycled back to the Tasman Sea after it meets more newly formed waters from the east, and/or (2) that some of the AAIW from the east is forced north by outflows from the Coral/Tasman Seas and does not penetrate appreciably into the Tasman/Coral Seas at the approach latitude. Recirculation would prevent a complete renewal of the AAIW in the Tasman/Coral Seas. Reid's (1986) adjusted steric-height map for 1000 dbar (partly shown in in Fig. 4*e*) shows a system of three anticyclonic gyres in the south-western Pacific, including a localized anticyclonic gyre in the Tasman/Coral Sea, all of which could lead to recycling of some of the AAIW. Johnson (1973) shows a cyclonic gyre for the 27·10 sigma-*t* surface in the central Tasman, but he was unsure of the feature and present evidence indicates that the contours do need revision here.

Recirculation is possibly the reason for the irregular oxygen content and low oxygen values noted by Wyrtki (1962*a*) in the central Tasman for 30–40°S, from which he concluded that no clearly developed circulation exists in the central Tasman at the depth of the salinity minimum. Station data gathered since then indicate this is not so in the western Tasman, as discussed earlier. Little evidence is available in the eastern Tasman. Wyrtki (1962*b*) later discusses the absence of distinctive circulation of AAIW north of 25°S in the Tasman, based on geopotential topography rather than the central Tasman, and this agrees with Reid's (1986) maps. Wyrtki (1962*a*) thought that the bulk of the AAIW from the east left north of Australia, with only a small part mixing into the Tasman Sea, which can fit either interpretation (1) or interpretation (2) above. The Tasman Sea winter outflow to the north-east described herein would prevent the entry of at least the upper levels of AAIW from the east into the Coral Sea and would force it north. The low oxygen values found by Wyrtki (1962*a*) are then more likely to be due in part to a recirculation or outflows preventing the area from receiving the full oxygen content of fresh AAIW waters than to lack of distinctive circulation. A review of AAIW circulation in the western Coral Sea is given by Pickard *et al.* (1977), who concluded that AAIW might enter the area 10–30°S,145–160°E from the south-east and the north-east, passing south of the Solomon Islands after making a wide circuit through the equatorial regions. Evidence for the south-east entry does not appear to be conclusive.

The deep temperature inversions described herein are important not only as interesting natural phenomena but also as pointers to flow paths and mixing areas for AAIW in the south-western Pacific Ocean. By inference, the observations described here coincide well with several circulation features described by Rochford (1960*a*), Wyrtki (1962*a*), Johnson (1973) and particularly Reid (1986) at the level of the AAIW, which is a step towards confirming some of their models of flow. Wyrtki's (1962*a*) broad patterns for core analysis in the Tasman Sea are not altered, can be given more detail, and can be better explained in some areas in terms of the dynamics of flows at intermediate levels. Johnson's (1973) broad flow patterns apparently need enhancement in the Tasman and immediately west and north-west of New Zealand, while those of Reid (1986) generally show very good agreement with the data used in this analysis, except for inflow at 1000 m into the Tasman Sea along 30°S, where Seamap data indicate that outflow seems to occur. Seasonal effects could cause changes not represented in the climatological patterns of Johnson (1973) and Reid (1986).

Summary

(1) New features (intermediate-depth medium-scale thermohaline structure) of the Antarctic Intermediate Water and its flow patterns in the south-western Pacific have been positively identified and mechanisms found for their occurrence in some areas.

(2) The patterns of several different models of circulation at the level of the AAIW have been indirectly verified for some areas, with other areas needing revision or further study.

(3) The East Australian Current system and its outflows appear to have a considerable influence on the flow of the AAIW in the Tasman Sea area, and continuations east and south-east of New Zealand also have a marked effect.

(4) The peculiarities of the temperature–salinity regime of the Tasman Front apparently explain the lack of temperature inversions and perturbations there, but the origin of the thermohaline structure itself needs to be investigated further.

Acknowledgments

The bulk of the CTD processing programmes were written by Dr Neil White of the CSIRO Marine Laboratories, Hobart. Thanks are due to CSIRO for making the programmes available. The CTD data were principally obtained by the author, Mr John Boyle, and Mr Barry Scott, all of the Maritime Systems Division, DSTO. Mr Martin Zile of the Hydrographic Office North Sydney and Dr Mark Irving of the Maritime Systems Division provided useful advice on reading and decoding the CTD magnetic data tapes. Station-keeping and winch operations were controlled by HMAS *Cook* naval staff. The ready assistance of the HMAS *Cook* data-centre watchkeepers during CTD operations is much appreciated.

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TECHNICAL MEMORANDUM
WSRL-TM-31/88

OCEANOGRAPHIC DATA REPORT FOR SOUTH WEST PACIFIC CRUISES IN THE SEAMAP SERIES. PART 1. SUMMER SURVEY DATA 1984 TO 1987

L.J. Hamilton and J.A. Boyle

SUMMARY (U)

Six oceanographic surveys have been made in the south west Pacific Ocean on HMAS Cook from January 1984 to September 1987 as part of an investigation of physical and acoustical oceanographic parameters known as project SEAMAP. This report presents summer survey data for bathymetry, sea surface temperature, wind speed, sea state and swell, and from expendable bathy-thermograph (XBT) drops, and CTD and Nansen stations. Underwav data are mostly presented as four-hourly discrete values on maps of ship track, forming a representative data set rather than a detailed analysis. (The summer survey tracks were also traversed in oceanographic winter; the winter data are presented in a separate report.)

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INTRODUCTION

This report presents oceanographic data for the south Pacific Ocean collected during a series of three summer surveys on HMAS Cook by the then Royal Australian Navy Research Laboratory (RANRL), as part of an investigation known as Project SEAMAP. This organisation became part of Maritime Systems Division in 1987. Data collected during the corresponding winter surveys are reported in a separate publication (Hamilton and Boyle, 1989). Project SEAMAP surveys are made along major shipping routes, and are planned to encompass the seas about Australia (figure 1). The principal aim of SEAMAP is to investigate geophysical and oceanographic factors influencing sonar performance. Acoustic properties of the water column are measured along the same track in both winter and summer to obtain the seasonal extremes.

The South Pacific surveys were conducted along two major routes, designated A and B (figure 1). These routes were covered on several cruises, with route B summer being SEAMAPS 1 and 5, and route A summer being SEAMAP 3. (Route A winter was covered in one cruise, SEAMAP 6, and route B winter covered in two cruises, SEAMAP 2 and SEAMAP 4). The actual summer and winter cruise tracks followed are shown in figures 2 and 3 with the identifying cruise name and cruise number (eg SEAMAP 1 and RANRL 1/84). Oceanographic station positions, occupied in both summer and winter, are shown in figure 4. Only the Pacific Ocean surveys in figure 1 have been undertaken to date.

Detailed analyses are not made in this memorandum, but pointers are given to some of the main features of interest in the data. In addition, major ocean current features are identified when appropriate. Data for the three surveys given in this report (SEAMAP 1, SEAMAP 3, and SEAMAP 5) are discussed in separate sections, each independent of the other sections. These three sections are preceded by general sections on the data types described, and CTD (Conductivity-Temperature-Depth profiler) data processing.

The CTD salinity data for surveys SEAMAP 3 and SEAMAP 5 are not well calibrated, and should be used for profile shapes, rather than for absolute salinity values. For the surveys the CTD was used principally as a velocimeter, with sound-speed obtained from an independent sensor also attached to the CTD.

Text continued on page 4

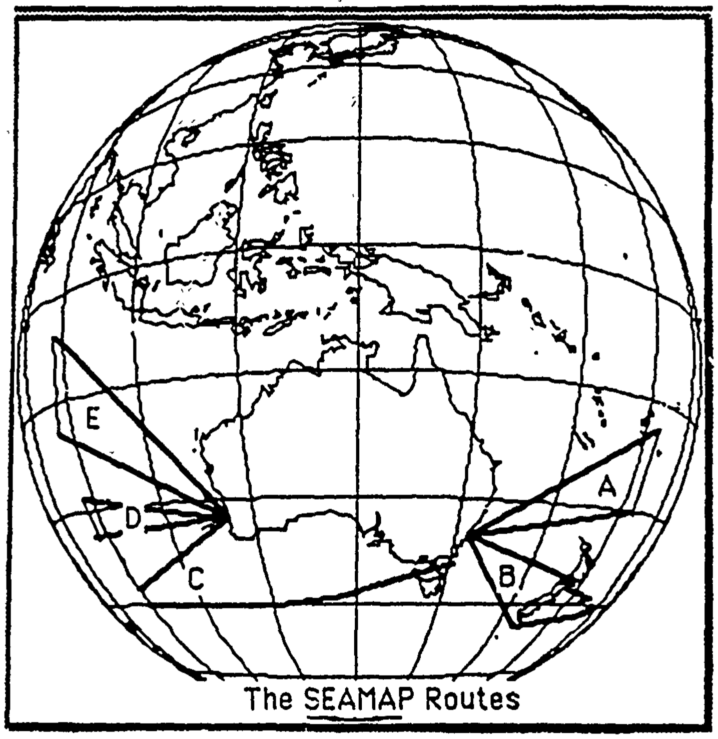


Figure 1. Planned survey routes for Project SEAMAP. Each route to be traversed in both summer and winter. Only the Pacific Ocean surveys have been conducted to date

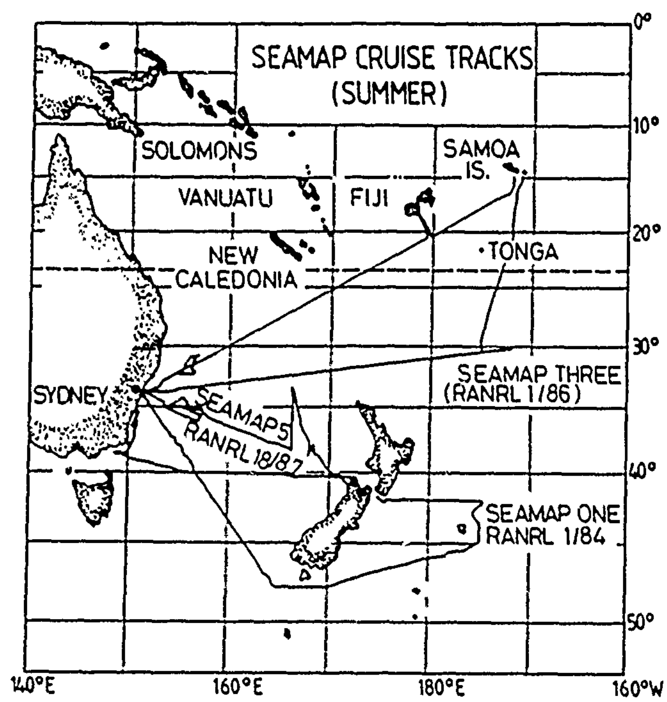


Figure 2. Actual summer routes for Project SEAMAP in the south west Pacific Ocean for 1984 to 1987

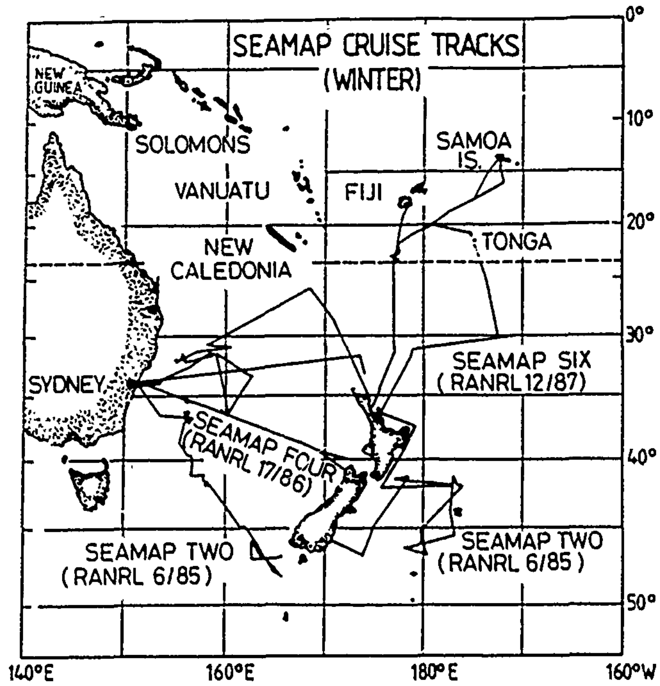


Figure 3. Actual winter routes for Project SEAMAP in the south west Pacific Ocean for 1985 to 1987

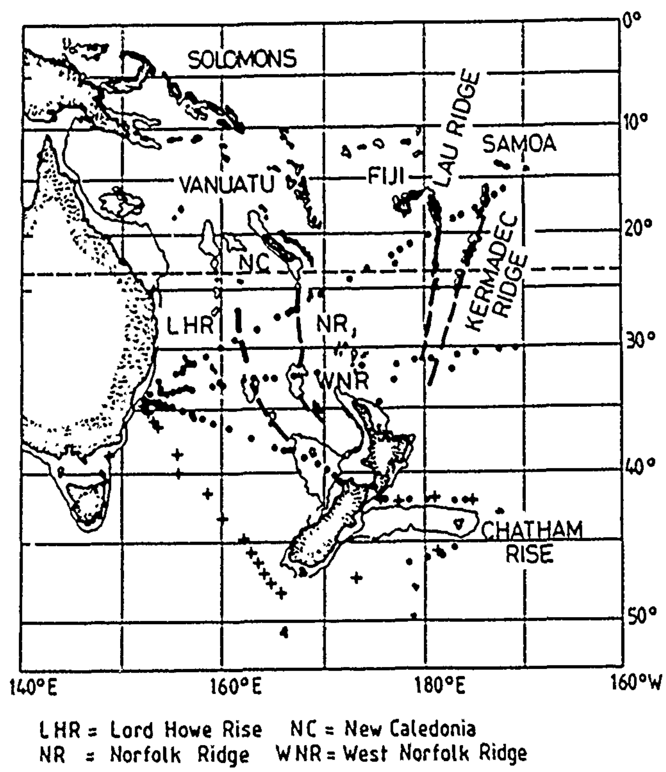


Figure 4. Oceanographic station positions for Project SEAMAP summer and winter surveys in the south west Pacific Ocean for 1984 to 1987. The 1000 m depth contour is also shown. (+ are Nansen stations, . are CTD stations; thick dashed lines are ridges and rises)

SEAMAP DATA TYPES AND DATA FORMAT

The types of oceanographic data presented in this report, and brief reasons for measuring them are as follows:

(a) Sea state, swell height, and wind vectors are plotted along ship track from four-hourly observations. [These are indicative of surface roughness and acoustic reflection losses at the air-sea interface.] Table 1 (on page 5) shows the sea conditions associated with the sea state values. The sea state and swell observations were made visually by HMAS Cook's bridge watchkeepers.

(b) Surface Temperature and Salinity. Sea surface temperature (SST) values are plotted along ship track from four-hourly observations taken from a hull mounted sensor. Surface salinity samples are also shown. [Surface measurements can show the positions of surface fronts.]

(c) Bathymetry. Cross-sections along ship track are constructed from hourly observations [Topography affects bottom bounce acoustic propagation and paths of currents.]

(d) Subsurface parameters. Cross-sections are constructed from expendable bathy-thermograph (XBT), Nansen station and Conductivity-Temperature-Depth (CTD) profiler data. [Related to surface duct sound speed profiles and propagation.]

(e) Nansen station temperature, salinity and depth data are given as listings (and plots) at measured and interpolated depths. [Gives sound-speed profiles and components of geostrophic current.]

(f) VCTOD (Velocity of sound, Conductivity, Temperature, Oxygen, Depth) profiler values are given as listings and plots. [Provides continuous sound-speed profiles.]

The discrete values given herein represent a subset of the available data. Continuous observations were also made of some of these and a range of variables which were automatically recorded by HMAS COOK's Hewlett Packard HP1000 data logger. The parameters logged, with sensor type, resolution, and data rate, are given in Appendix I (page 145). Any requests for copies of the logged data should be sent to the Australian Oceanographic Data Centre, C/- Hydrographic Office, 161 Walker Street, North Sydney, NSW 2060, Australia.

Acoustic bottom bounce propagation experiments, sea noise and volume reverberation measurements, bottom coring, and seismic profiling were also undertaken during the surveys. These will be reported separately by other authors. Appendix II (page 1'7) lists reports in these categories available as of May 1989.

TABLE 1. BEAUFORT SCALE WITH CORRESPONDING SEA STATE CODES

—Beaufort Scale with Corresponding Sea State Codes

Sea State	Beaufort number	Wind speed: knots	Wind speed: mph	Wind speed: meters per second	Wind speed: km per hour	Seaman's term	U. S. Weather Bureau term	Estimating wind speed: Effects observed at sea	Estimating wind speed: Effects observed on land	WMO Code: Term and height of waves, in feet	WMO Code: Code
0	0	under 1	under 1	0.0-0.2	under 1	Calm	Light	Sea like mirror.	Calm; smoke rises vertically.	Calm, glassy, 0	0
½	1	1-3	1-3	0.3-1.5	1-5	Light air		Ripples with appearance of scales; no foam crests.	Smoke drift indicates wind direction; vanes do not move.		
1	2	4-6	4-7	1.6-3.3	6-11	Light breeze		Small wavelets; crests of glassy appearance, not breaking.	Wind felt on face; leaves rustle; vanes begin to move.	Rippled, 0-1	1
2	3	7-10	8-12	3.4-5.4	12-19	Gentle breeze	Gentle	Large wavelets; crests begin to break; scattered whitecaps.	Leaves, small twigs in constant motion; light flags extended.	Smooth, 1-2	2
3	4	11-16	13-18	5.5-7.9	20-28	Moderate breeze	Moderate	Small waves, becoming longer; numerous whitecaps.	Dust, leaves, and loose paper raised up; small branches move.	Slight, 2-4	3
4	5	17-21	19-24	8.0-10.7	29-38	Fresh breeze	Fresh	Moderate waves, taking longer form; many whitecaps; some spray.	Small trees in leaf begin to sway.	Moderate, 4-8	4
5	6	22-27	25-31	10.8-13.8	39-49	Strong breeze	Strong	Larger waves forming; whitecaps everywhere; more spray.	Larger branches of trees in motion; whistling heard in wires.	Rough, 8-13	5
6	7	28-33	32-38	13.9-17.1	50-61	Moderate gale		Sea heaps up, white foam from breaking waves begins to be blown in streaks.	Whole trees in motion; resistance felt in walking against wind.	Very rough, 13-20	6
7	8	34-40	39-46	17.2-20.7	62-74	Fresh gale	Gale	Moderately high waves of greater length; edges of crests begin to break into spindrift; foam is blown in well-marked streaks.	Twigs and small branches broken off trees; progress generally impeded.		
8	9	41-47	47-54	20.8-24.4	75-88	Strong gale		High waves; sea begins to roll; dense streaks of foam; spray may reduce visibility.	Slight structural damage occurs; slate blown from roofs.		
9	10	48-55	55-63	24.5-28.4	89-102	Whole gale	Whole gale	Very high waves with overhanging crests; sea takes white appearance as foam is blown in very dense streaks; rolling is heavy and visibility reduced.	Seldom experienced on land; trees broken or uprooted; considerable structural damage occurs.	High, 20-30	7
10	11	56-63	64-72	28.5-32.6	103-117	Storm		Exceptionally high waves; sea covered with white foam patches; visibility still more reduced.	Very rarely experienced on land; usually accompanied by widespread damage.	Very high, 30-45	8
11	12	64-71	73-82	32.7-36.9	118-133	Hurricane	Hurricane	Air filled with foam; sea completely white with driving spray; visibility greatly reduced.		Phenomenal, over 45	9
12	13	72-80	83-92	37.0-41.4	134-149						
13	14	81-89	93-103	41.5-46.1	150-166						
14	15	90-99	104-114	46.2-50.9	167-183						
15	16	100-108	115-125	51.0-56.0	184-201						
16	17	109-115	126-136	56.1-61.2	202-220						

Note: Since January 1, 1956, weather map symbols have been based upon wind speed in knots, at five-knot intervals, rather than upon Beaufort number.

▼ 8/8 completely overcast
0/8 no clouds

● c = celestial
r = radar
s = satnav
dr = dead reckoning

BRIEF INTRODUCTION TO OCEANOGRAPHY OF THE SOUTH-WEST PACIFIC

In general it is the conditions in the upper hundreds of metres which are of most importance to the SEAMAP project, since this is where parameters vary most rapidly. The oceanography of seas to the east of New Zealand is not well known, and much of Tasman Sea behaviour has yet to be clarified. For example, it is generally believed that the East Australian Current flows in a general west to east direction (after leaving the Australian coastline) as the Tasman Front, but only a handful of surveys have attempted to follow this front. The interaction of the front with the Lord Howe Rise has only recently been investigated in any detail. Seasonal behaviour of currents and convergences are virtually unknown in many areas of the South Pacific Ocean.

The general positions of currents and convergences are shown diagramatically in figure 5(a) on page 7, and figure 5(b) on page 8. Convergences are regions where two currents meet (or converge), the two currents flowing in directions that cause surface waters to pile up and sink between them. Divergences are regions where waters from two currents move away from each other, with water upwelling between them to preserve continuity of volume. (Both convergences and divergences can occur for currents flowing in the same direction, or opposite directions, depending on orientation in the hemisphere. For example, see Pickard and Emery, 1982.)

The following descriptions of currents shown in figure 5 are constructed from various sources, including Heath (1985) (New Zealand waters), Wyrtki (1960) (general), Henin and others (1984) (New Caledonia), Nilsson and Cresswell (1981). Although some currents are described as well known permanent features of the circulation eg those east and north of New Zealand, not enough surveys have been made to define more than broad tendencies of flows in most parts of the Pacific.

The East Australian Current (EAC) originates in the northern and western Coral Sea where waters piled up by the South-east Trade Winds are constrained to flow southward by the land barriers of New Guinea and Australia. The broad and diffuse Trade Drift sets through Fiji and Vanuatu into the Coral Sea. From April to December the drift splits to flow west-north-west of the Solomons, and into the Coral Sea. From January to March the monsoon allows equatorial water masses to enter from north and north-east between the Solomons and Vanuatu. The Trade Drift is displaced to the south, then being mainly south of the Fiji Islands. The southern boundary of the Trade Drift is subject to considerable fluctuation, and normally corresponds to the position of the Tropical Convergence. From June the current shifts northwards, reaching its most northern position in September, with flow south of Fiji small and weak, and a possible flow reversal south of New Caledonia.

The East Australian Current generally heads seawards near 33 to 34 S to form the meandering Tasman Front. Mesoscale warm core eddies may be spawned south of the front by these meanders, with lives of 6 to 12 months. A component of the current sometimes flows along the east coast of Tasmania, flooding eastern Bass Strait in the process. Waters generally move west to east through Bass Strait into the Tasman Sea under the influence of the prevailing wind systems. The high salinity waters originating in Bass Strait may be found as salinity and temperature inversions throughout the Tasman Sea, and are often transported east by eddies (eg Scott 1981), and on the Tasman Front, as well as northwards along the Australian continental slope, at depths up to 600 m.

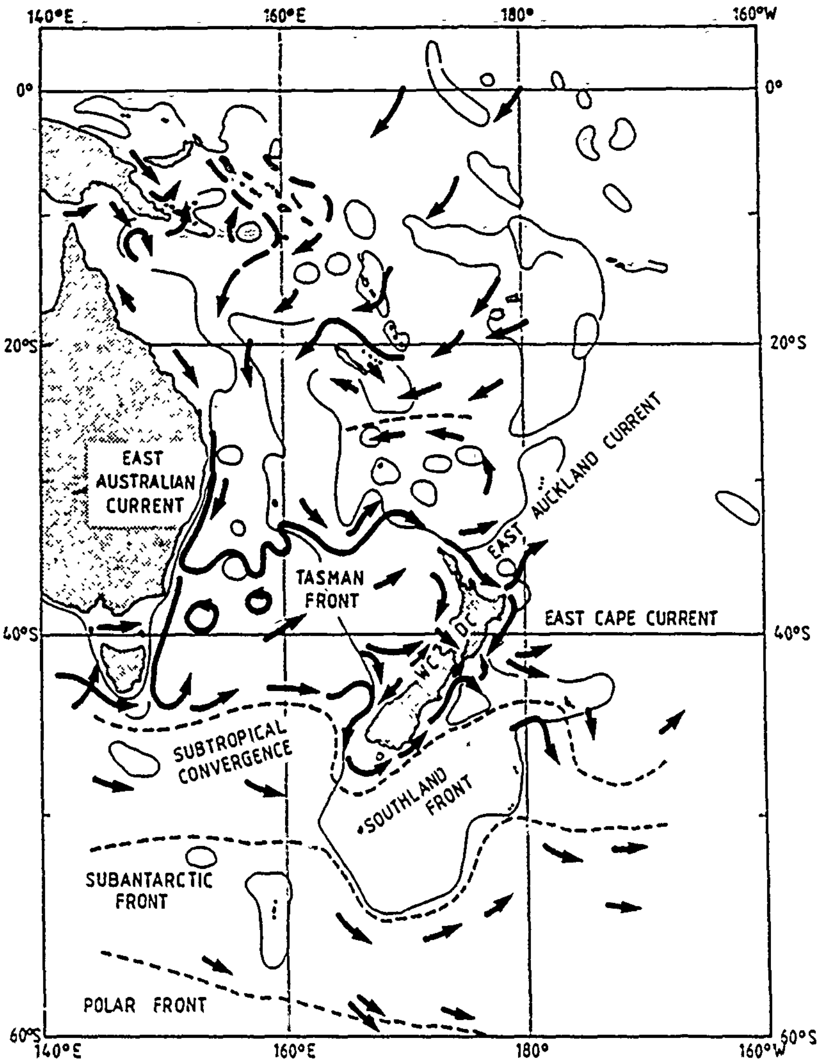


Figure 5(a). General circulation and position of fronts in the south-west Pacific Ocean for summer. (After several sources, especially Heath, 1985 and Wyrtki, 1960). (DC = D'Urville Current, WC = Westland Current). The depth contour shown is for 1000 fathoms

The eastward flow of the EAC is influenced by the shallower topography of the Lord Howe Rise, often looping north along the rise, and Norfolk Ridge. The Tasman Front can be traced to at least 160 E but its path then is not well defined. Warren (1970) postulates it as a zonal jet needed to connect the western boundary current off the eastern coast of Australia to the flow east of New Zealand.

South of Australia and New Zealand the broad, deep eastward flowing West Wind Drift (or Antarctic Circumpolar Current) forms the only current running completely round the globe. The northern boundary of eastward flow marks the Subtropical Convergence at about 43 S. The Antarctic Polar Frontal Zone occurs at about 50 S. Waters south of this zone cool and sink to as far north as the Subtropical Convergence, forming several water masses, including Antarctic Intermediate Water. The Subtropical Convergence is at its most northerly from April to October (winter). East of South Island New Zealand the convergence is situated along the coastline, passing through the Snares Depression, along the continental shelf of eastern South Island, and through the Mernoo Saddle. Along the coast it is also known as the Southland Front (and Southland Current). East of the Chatham Rise the convergence generally projects southwards. Much of the flow east of New Zealand is constrained by the shallow topography of the Chatham Rise.

Flow out of the Tasman Sea north of New Zealand gives rise to the East Auckland Current (figure 5(b)) flowing south along the eastern coast of the north island. The current branches near East Cape, returning north, and also contributes to the East Cape Current, a warm saline flow. Water passes eastwards through Foveaux Strait (south of South Island) from along the southern flank of the Challenger Plateau. Flow occurs to the south along the continental slope of the south-west coast of the south island (the Southland Current). The Southland current appears related to the Subtropical Convergence. Waters of the D'Urville, Westland, and East Cape Currents mix in Cook Strait, exiting eastwards around Cape Palliser.

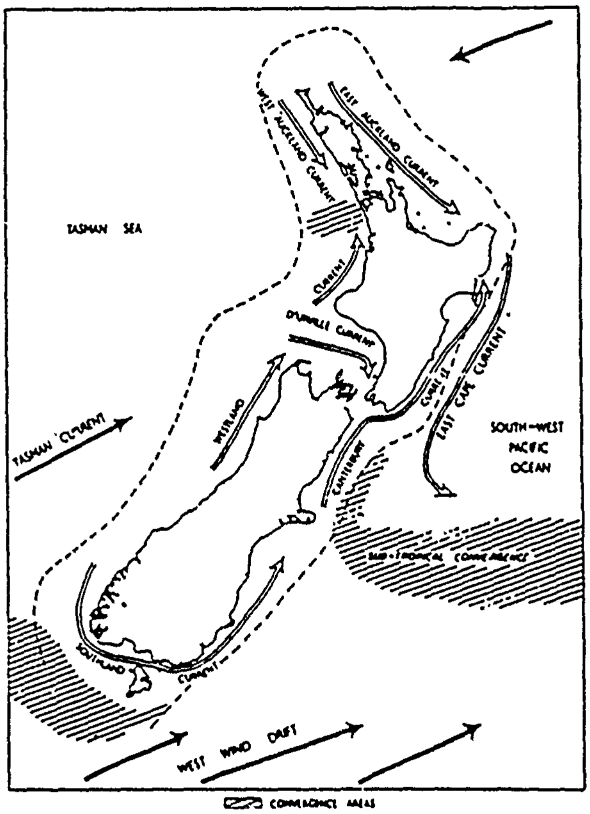


Figure 5(b). Coastal current patterns derived from drift card tracks around New Zealand (Brodie, 1960)

Henin, Guillerm, and Chabert (1984) describe flow around New Caledonia in terms of two wind regimes. During the trade winds (nearly all year round) flow is to the north west, with a south-east component along the northern end of the southern part of New Caledonia. For periods about July-August a westwind regime may cause flow to the south-east on both sides of the southern regions of New Caledonia, with variable flow.

Throughout the eastern part of the south-west Pacific the circulation patterns are little known. Reid (1986) derived general circulation patterns for the South Pacific using an extremely sparse station network, which east of New Zealand very generally show west to east flow, with an unclosed meander centred at 42°S, 165°W. Surface flow to the east of New Zealand in the area east of Chatham Rise is generally to the south-east. Eastward flow at these latitudes constitutes the southern part of an ocean basin scale gyre which flows anti-clockwise around the Pacific. The East Australian Current, described earlier, forms the western boundary current of this circulation. A useful bibliography of the physical oceanography of the Tasman and Coral Seas is given by Stanton (1975).

DATA PROCESSING FOR NANSEN AND CTD DATA

Nansen station data and processing

Nansen station data were taken using the standard procedures outlined in Publication 607 (US Naval Oceanographic Office, 1970). The bow thruster and active rudder on HMAS Cook were used to keep the wire on the hydrology winch near vertical. Oxygen samples were analysed using the Winkler method (Major and others, 1972). Salinity samples were analysed for conductivity ratio using an Autolab Inductive Salinometer Mk III model.

Derived quantities such as salinity and sound-speed were calculated using the algorithms shown in Table 2. Reversing thermometer temperatures were calibrated and pressure corrected using desktop computer programs (Hamilton, 1982) which are corrected versions of May (1969). Dynamic heights and geostrophic currents were calculated using computer programs in Hamilton (1982), which are also corrected and updated versions of May (1969).

TABLE 2. REFERENCES TO ALGORITHMS USED TO PROCESS NANSEN STATION DATA

(DSRT = Deep Sea Reversing Thermometer)

CALCULATION	REFERENCE
DSRT Temperature Correction	SVERDRUP (1947)
DSRT Reversal Depth	WUST (1933)
Conductivity to Salinity	LEWIS (1980)
Depth to pressure	SAUNDERS (1981)
Density - One Atmosphere	MILLERO and POISSON (1981)
- High Pressure	MILLERO, CHEN, BRADSHAW and SCHLEICHER (1980)
Potential Temperature	BRYDEN (1973)
Sound Speed	WILSON (1960)

VCTOD calibration

The VCTOD [(Velocity of sound, Conductivity, Temperature, Oxygen, Depth (actually pressure)] profiler is a Plessey model 9041. Sensor precisions and resolutions are given in Table 3. Oxygen was not measured with the VCTOD.

TABLE 3. VCTOD SENSOR CHARACTERISTICS

Sensor	Range	Time Constant (s)	Resolution	Precision	Logged Precision	Manuf. Calibs (Info only)
Conductivity [C]	10 to 60 mmho/cm	0.015	0.01	0.005	0.01	0.03
Temperature [T]	-2 to 35 deg.C	0.312	0.01	0.005	0.01	0.02
Depth [D]	0 to 6000 m	0.02	0.1% FS (= 6 m)	0.04% FS (= 2.4 m)	1 m	0.1% FS
Sound Speed [V]	1400 to 1600 m/s	0.0001	Unknown	0.05	0.05	0.15

(The data rate is 1.66 Hz) (FS = Full Scale)

Absolute accuracy of the calibrated quantities, quoted as one standard error about the estimate, is as follows:

Pressure	6.3 dbar
Temperature	0.015°C (to 0.01°C for pressures over 4000 dbar)
Conductivity	0.04 mmho/cm (in upper waters) To 0.01 at depth (subject to shift)
Sound Speed	0.18 m/s.

Data are calibrated only from reversing thermometer and Niskin bottle measurements made at sea, no laboratory calibration facilities being available. Reversing thermometers and Niskin bottles were mounted in a rosette sampler, with sensors being less than 1 m below the bottles. For SEAMAP 5 a single Nansen bottle was triggered above the VCTOD, no rosette sampler being available, and the instrument being used as a velocimeter.

Because of an unexpected shift in the calibration of the conductivity signal from station to station, salinity calibration is often poor in terms of absolute value, and also varies between some stations. This means that the salinity data are not suitable for inclusion in oceanographic data bases, and not suitable for most dynamic calculations. The reason for the shift in conductivity calibration is not known.

The original cruise for which calibrations were established showed no shifts, and the conductivity sensor is an inductive type, which is not expected to either drift or shift. Calibration remained the same between some sets of stations, but varied at other times from station to station.

Because of the higher gradients in upper waters, it is expected that (without conductivity shifts) calibrations are more accurate at depth, to 0.01 units of temperature (degrees Centigrade), conductivity (mmho/cm), and salinity (PSU), and worsening to over 0.03 units towards the surface. The bulk of calibration data is biased to deeper values (4000 to 5000 m) which removes some bias caused at the top end, since calibration curves for the sensors are linear except for pressure. The calibrations were established from data combined from SEAMAP and other cruises (Hamilton, 1986).

The conductivity calibration from the inductive sensor takes the form of a linear correction curve having the same slope for all stations and with an offset term. The shifts in calibration change the value of the constant term, but not the slope. Ignoring a non-linear effect introduced in the calculation of salinity by the shifts means that the salinity profiles given herein have the right shape, but are displaced from their true absolute values by some additive constant. The constant in many cases is not well determined because only a few Niskin bottle samples were taken for each station. The samples were intended to act as checkpoints on an established calibration, rather than be used as calibration points.

The data for salinity and derived quantities dependent on salinity therefore cannot always be used for accurate calculations of differences between station pairs, or to calculate absolute values of derived quantities without uncertainty. Use of the data should be largely descriptive. Some sets of stations did show a consistent offset from the original linear calibration curve, reducing the errors in forming difference values between stations. These sets of stations could be used with a reasonable degree of confidence to establish geostrophic current profiles, for example, and are listed later for each survey.

It must be stressed that the salinity data are of poor quality for this type of instrument, and should be used only with extreme circumspection. Temperature, pressure, and sound speed accuracies are equal to or better than sample bottle measurements. The shapes of salinity profiles are expected to be correct, but shifted from true absolute values, in some cases by gross amounts. The few sample salinities for each cast have been used to match the data to absolute values. Sample bottle temperature/salinity pairs were checked against the down cast for consistency with the up cast. This approach is quite useful for stations not occupied in frontal regions. Since the function of the SEAMAP ocean station measurements was to obtain sound-speed profiles, the loss of quality salinity data did not affect the primary aims of the project, the VCTOD simply being used as a velocimeter.

VCTOD data processing methods

Derived quantities were calculated using the algorithms given in Fofonoff and Millard (1983). Data processing was performed using computer programs written by Dr N. White of CSIRO Marine Laboratories, Hobart. Mismatch in sensor time constants is allowed for by an exponential recursive filter, as described in Millard (1982). The data were obtained during the down casts, with only monotonically increasing pressure values being used.

The monotonically increasing pressure values were pre-smoothed using a two point centred running average to remove some of the steps caused by the low sampling rate. This introduces a non-linearity which is offset to some extent by averaging the pre-smoothed, lagged parameters over 10 dbar intervals before calculation of derived parameters.

For all stations the processing left few density inversions in the 10 dbar averages. Salinity profiles still contain spurious spikes, particularly at the base of the mixed layer. Spikes are caused in the calculated salinity values (by mismatch in the temperature and conductivity sensor time constants) at temperature inversions, subsurface mixed layers, and steps in temperature and/or conductivity. In most cases no attempt has been made to remove these spikes. They drastically alter the upper part of the temperature-salinity curve in many instances from its true shape, (eg see stations 27 and 28 for SEAMAP 3, where bogus spikes are seen at the base of the surface mixed layer). Deeper than the mixed layer, spikes are a useful indicator of real changes, eg temperature inversions, accompanied by real salinity changes, which are exaggerated in the spikes.

VCTOD data format

The VCTOD data are given in the form of plots and listings of parameters with pressure. A listing of the Niskin/Nansen sample bottle values for each station is given after the VCTOD data listings. The plots are drawn from averages of parameters over 10 dbar pressure intervals. Listings show 10 dbar averages spaced at selected intervals, with the 10 dbar pressure interval centred around the given pressure value.

From left to right the values in the listings (eg see page 54) are pressure, depth, temperature, salinity, sigma-t, anomaly of specific volume, geopotential anomaly, sound speed, potential temperature, number of observations in the 10 dbar interval, and standard deviation of temperature, then standard deviation of conductivity values for the 10 dbar interval.

THE SUMMER SURVEY DATA ARE PRESENTED ON FOLLOWING PAGES IN TWO PARTS.

PART A PRESENTS SUMMER DATA FOR ROUTE A OF FIGURE 1 (SEE PAGE 2)
ROUTE A WAS COVERED BY SURVEY SEAMAP 3 IN FEBRUARY - MARCH 1986

PART B PRESENTS SUMMER DATA FOR ROUTE B OF FIGURE 1 (SEE PAGE 2)
ROUTE B WAS COVERED BY TWO SURVEYS :- *SURVEY SEAMAP 1 IN JANUARY TO FEBRUARY 1984* *SURVEY SEAMAP 5 IN FEBRUARY 1987*

PART A - SUMMER SURVEY FOR SEAMAP SOUTH PACIFIC ROUTE A

Data for SEAMAP survey three (RANRL 1/86) - route A - summer

Part A presents data for a cruise made in south hemispheric summer (January to March 1986) from Sydney to Auckland, Apia (Western Samoa), and return to Sydney (figure 6). Acoustical and geophysical data for the cruise are given in other sources (see Appendix II). The cruise, designated as RANRL 1/86 (and SEAMAP 3), was the third of the SEAMAP series of cruises made on the naval oceanographic research vessel HMAS COOK. Data for the winter counterpart of this cruise, designated as RANRL 12/87 (and SEAMAP 6) will be given in a following report (Hamilton and Boyle, 1989).

Surface parameters

Sea state, swell height, and wind vectors

Four-hourly observations made by bridge watchkeepers are shown in figures 7 and 8. Table 1 shows the sea conditions associated with the sea state values. Generally sea states of 3 and less were encountered for the cruise, (the exception being sea state 4 on the return leg north of Sydney), associated with winds under 20 kn and swell height less than 1.5 m. This corresponds to smooth and slight to moderate conditions.

Surface temperature and salinity

Sea Surface Temperature (SST)

SST is shown in figure 9 as discrete values taken at four-hourly intervals from the continuous record of a hullmounted sensor. Highest temperatures (above 29°C) are seen to the north, increasing fairly regularly with decreasing latitude. Contours are shown in figure 10. Lower temperatures (below 23°C) are seen on the transit east from Sydney at 158 and 161°E (south-east and south-west of Lord Howe Island), and about 170°E (north west of New Zealand). Lowest temperatures are seen northeast of New Zealand. The sections of cruise track into New Zealand fall in the area of the Royal Meteorological Centre (RMC) Wellington SST Charts. Three RMC analyses for 10, 17, 24 February show quite different SST patterns, making analysis difficult (figure 11). Three colour coded images from CSIRO Aspendale for waters off Sydney are shown for 29 January, 18 March, and 25 March 1986 (figure 12). The images show the warmer waters and fronts of the East Australian Current system.

Sea Surface Salinity

Sea surface salinity samples were not taken on this cruise.

Text Continued on page 27

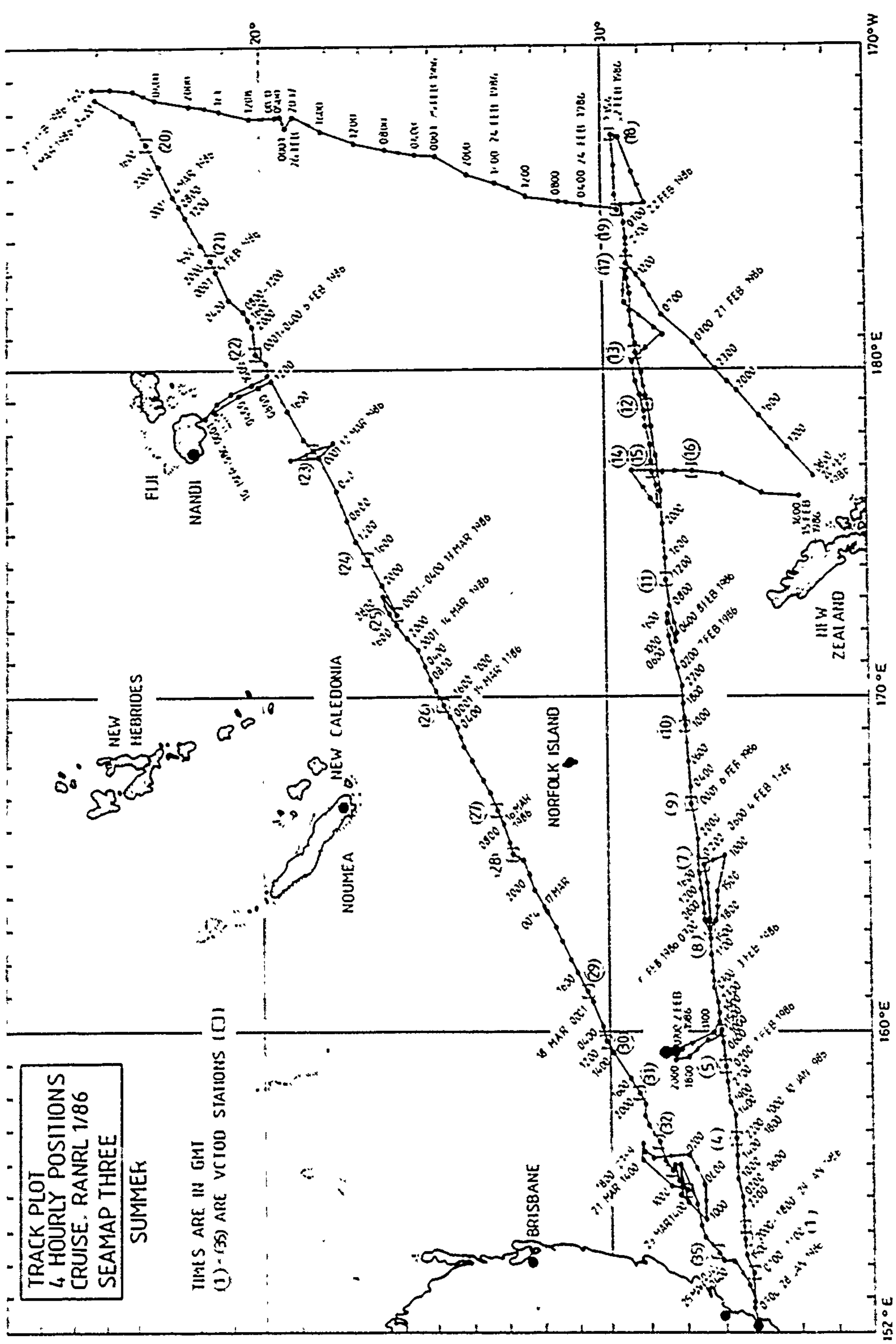


Figure 6. Track plot and oceanographic station positions for SEAMAP 3 (RANRL 1/86) summer survey on route A in the south west Pacific Ocean, 27 January 1986 to 25 March 1986

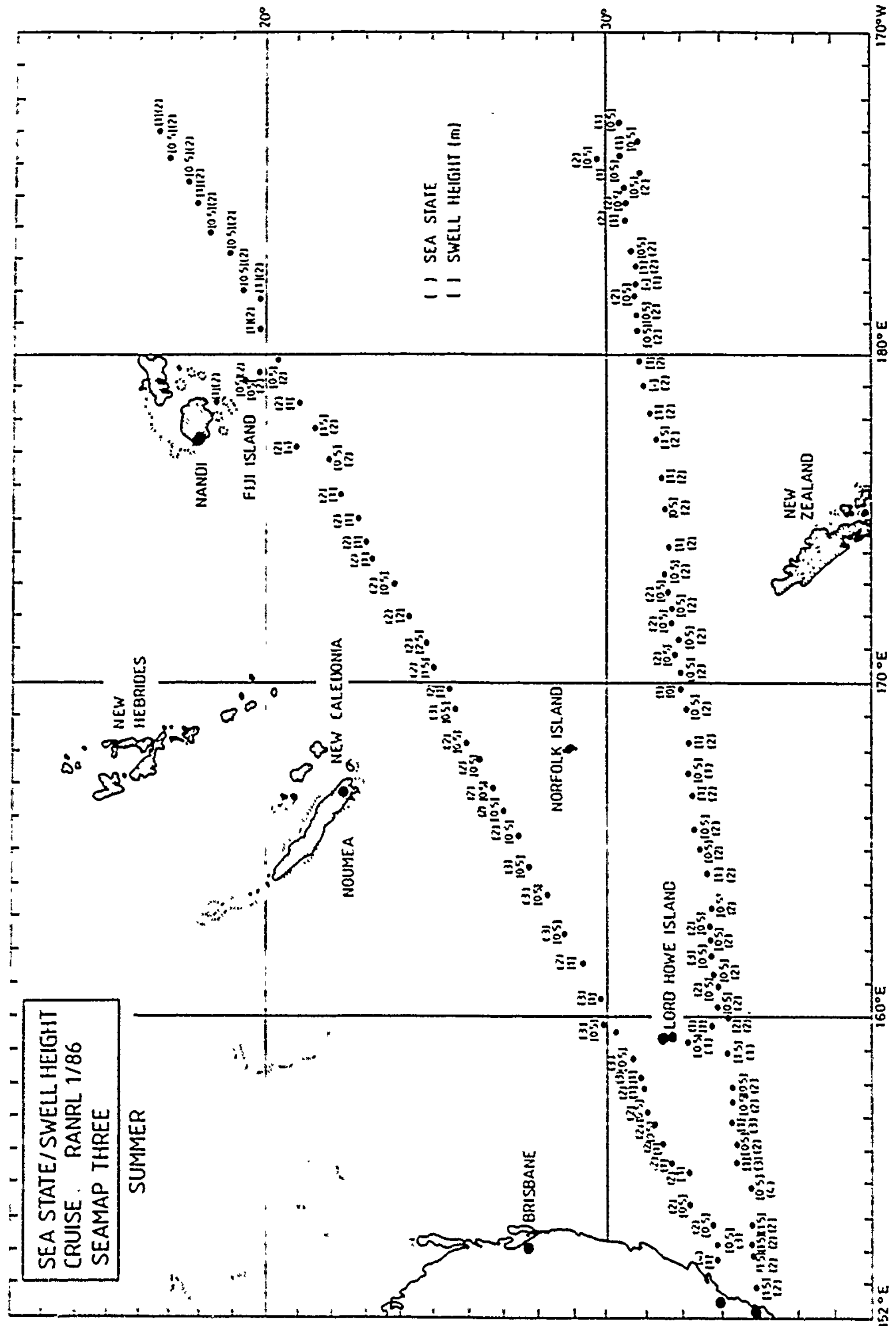


Figure 7. Sea state and swell height for SEAMAP route A in summer 1986 on survey SEAMAP 3 (RANRL 1/86)

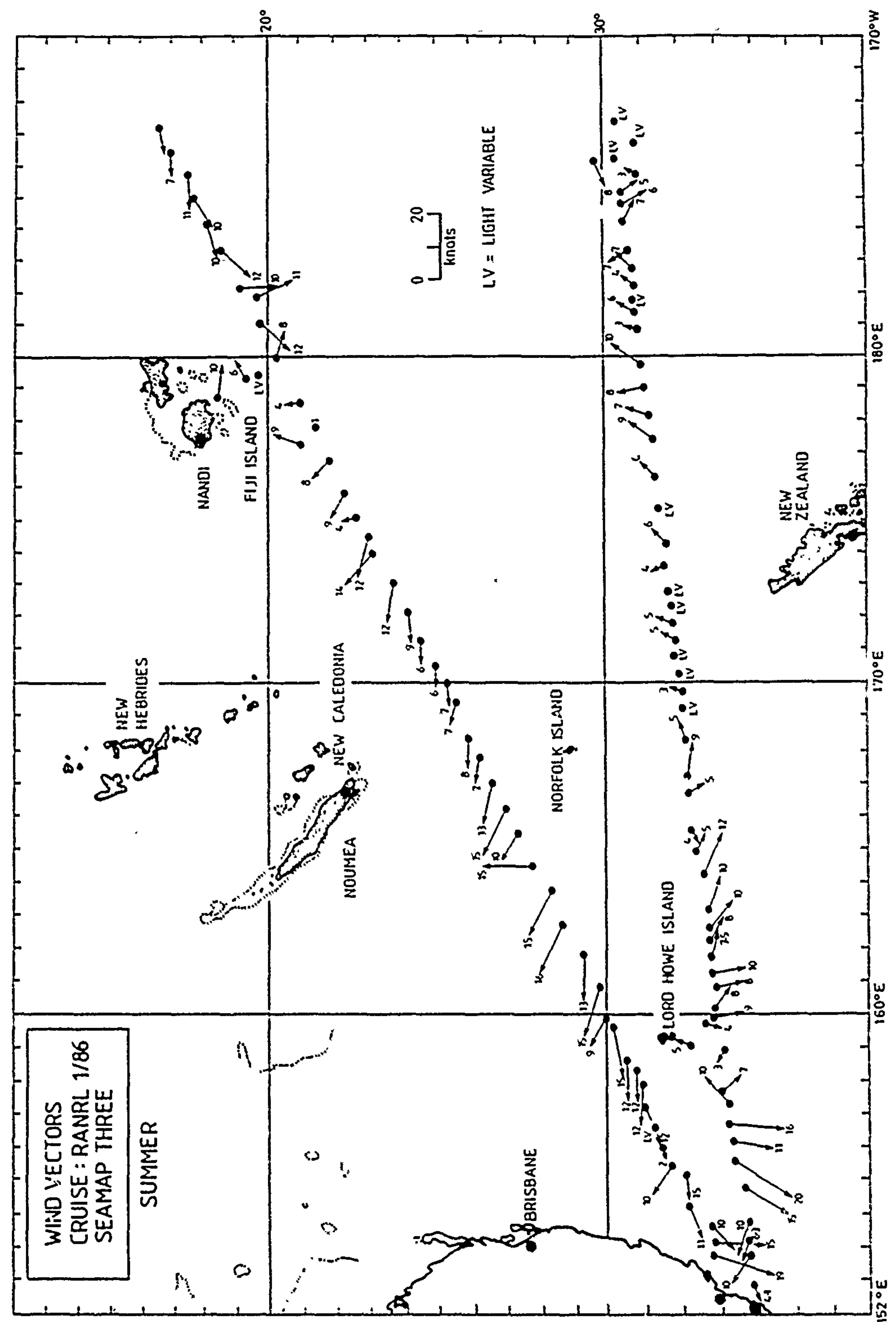


Figure 8. Wind vectors for SEAMAP route A in summer 1986 on survey SEAMAP 3 (RANRL 1/86)

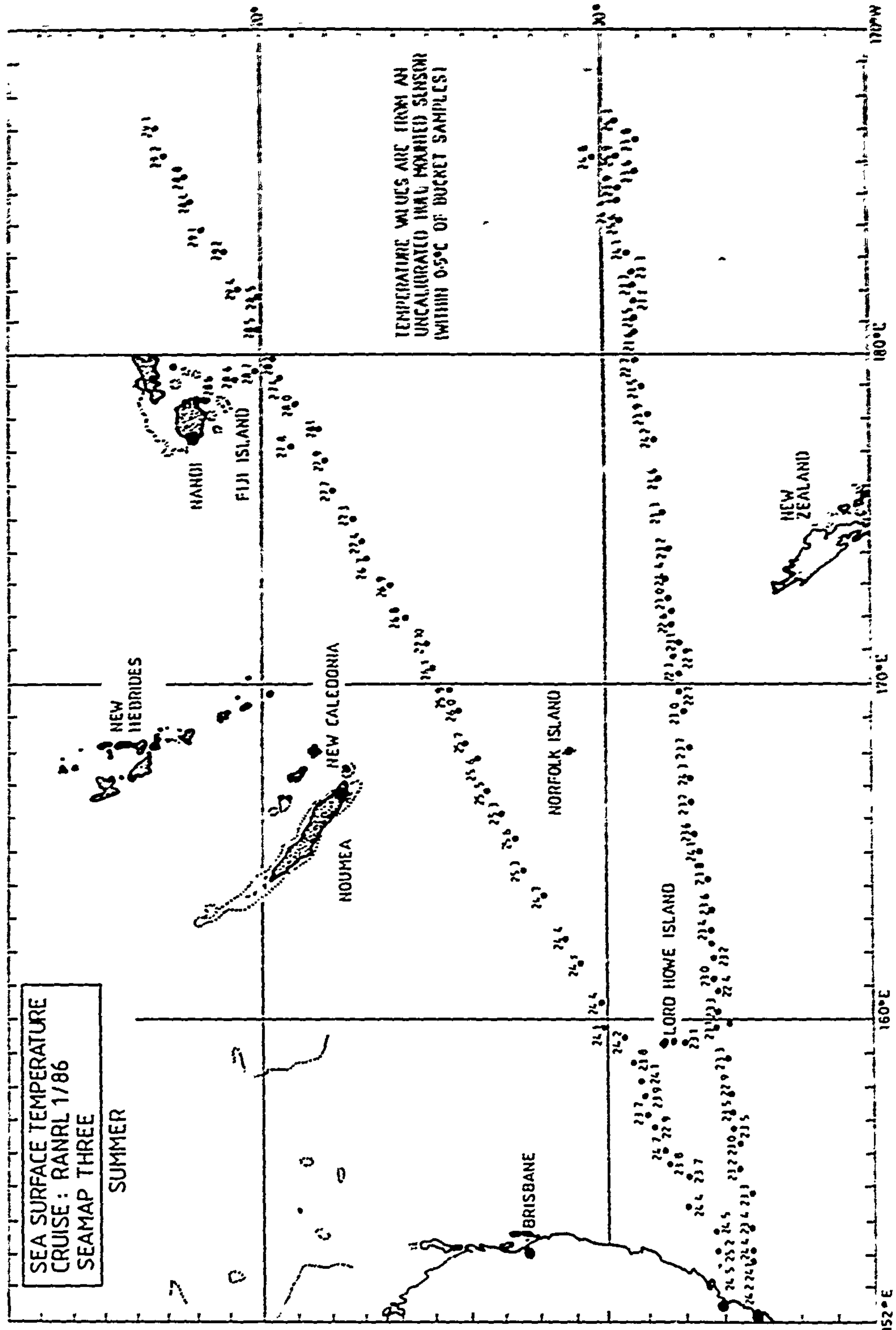


Figure 9. Sea surface temperature values for SEAMAP route A in summer 1986 on survey SEAMAP 3 (RANRL 1/86)

Seamap 3 - Route A - Summer

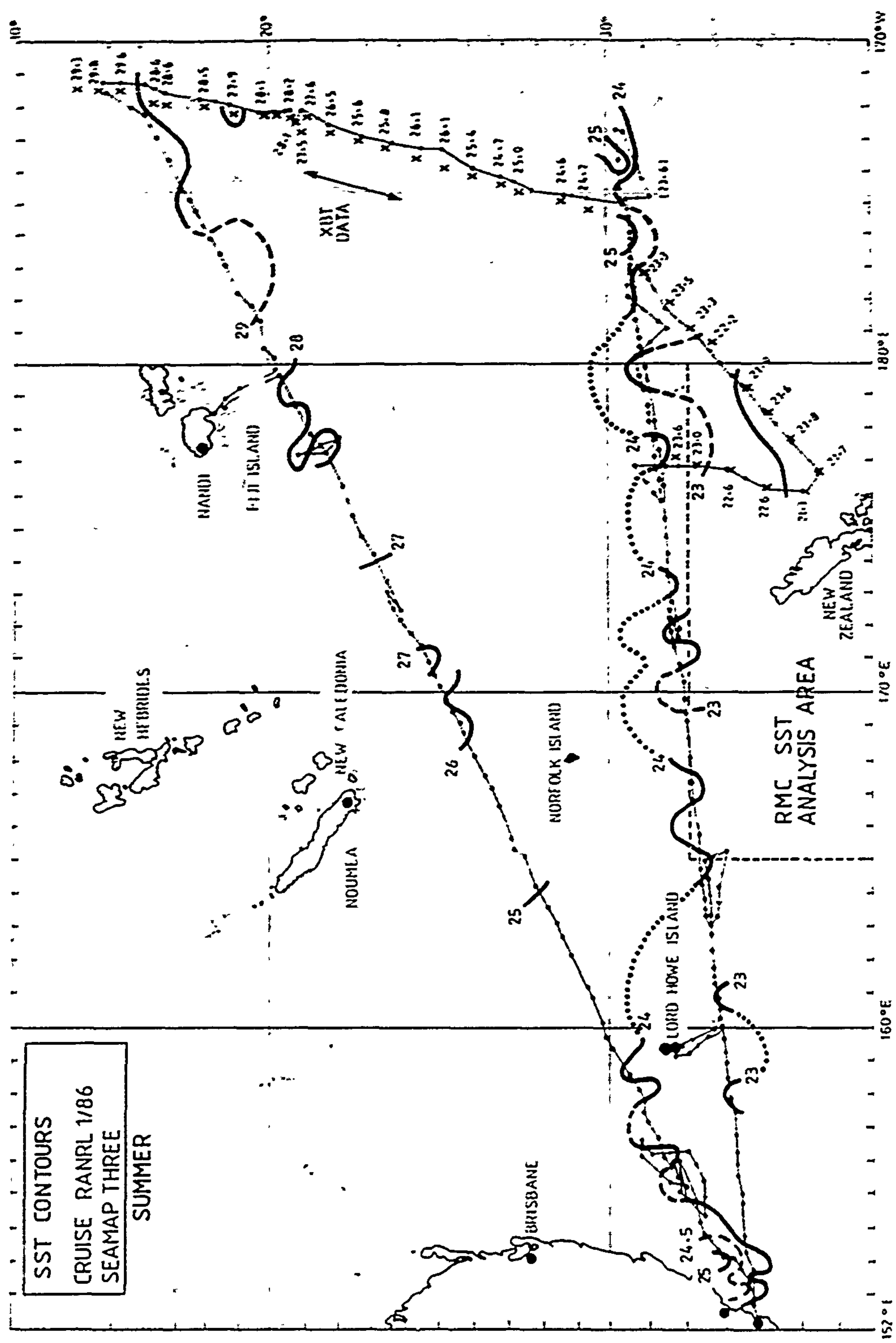


Figure 10. Sea surface temperature contours for SEAMAP route A in summer 1986 on survey SEAMAP 3 (RANRL 1/86)

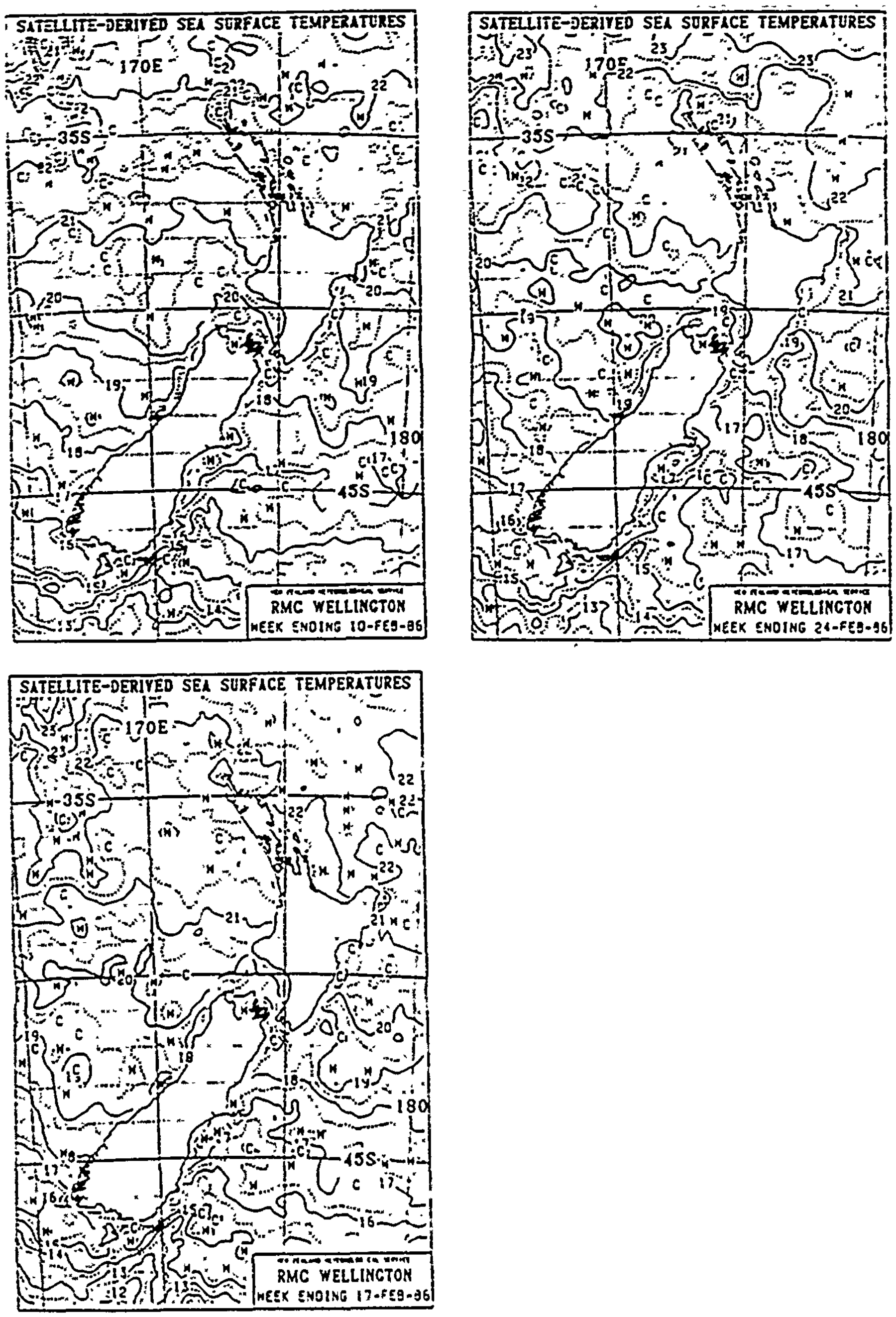


Figure 11. Sea surface temperature contours derived by Royal Meteorological Centre Wellington, New Zealand from satellite data for 10, 17, 24th February 1986 coinciding with sections of SEAMAP 3 summer survey (RANRL 1/86) route A

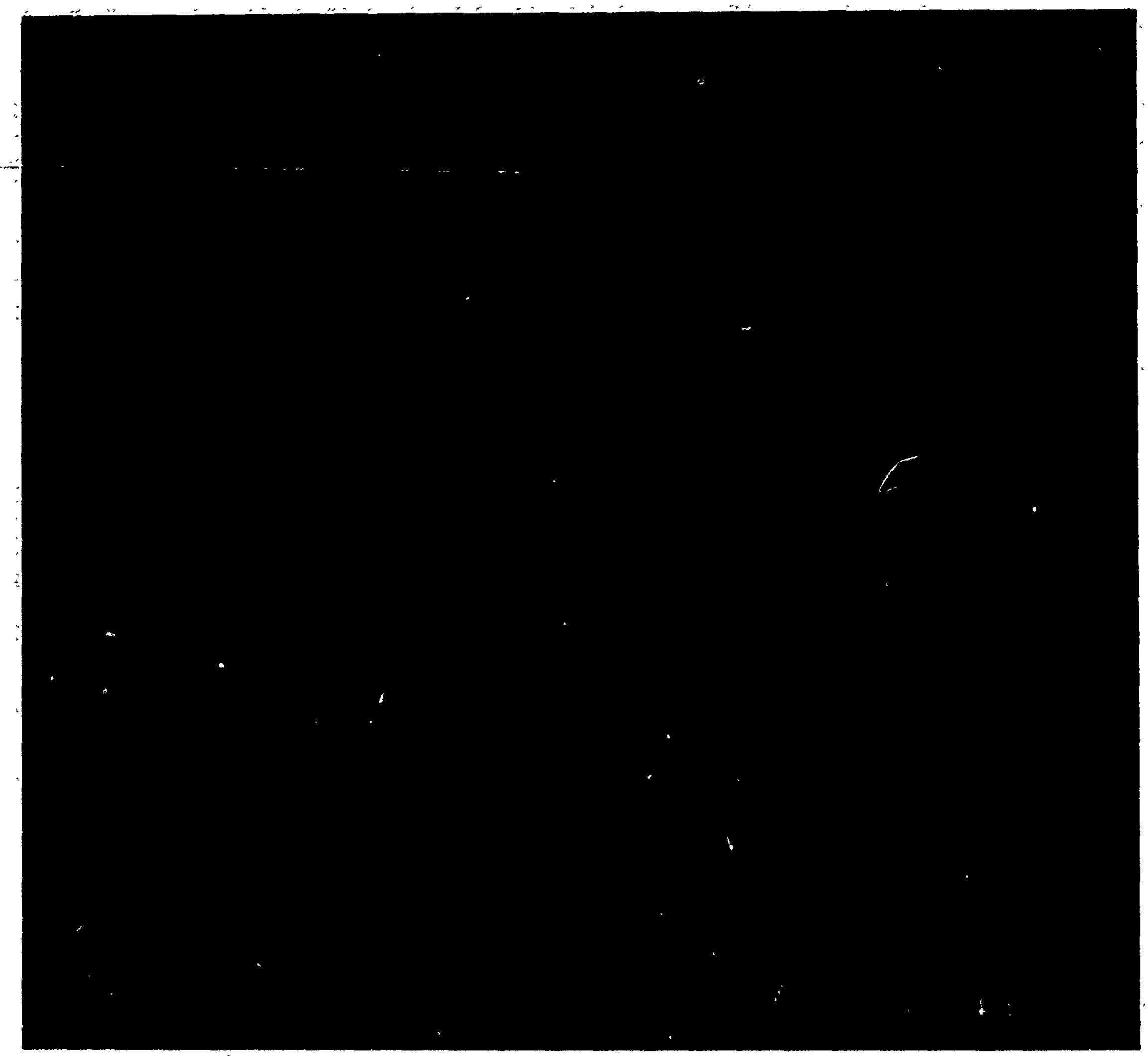


Figure 12(a). Sea surface temperature false colour satellite imagery from CSIRO Division of Atmospheric Research, Aspendale Victoria for 29 January, 1986 coinciding with sections of SEAMAP 3 summer survey (RANRL 1/86) route A

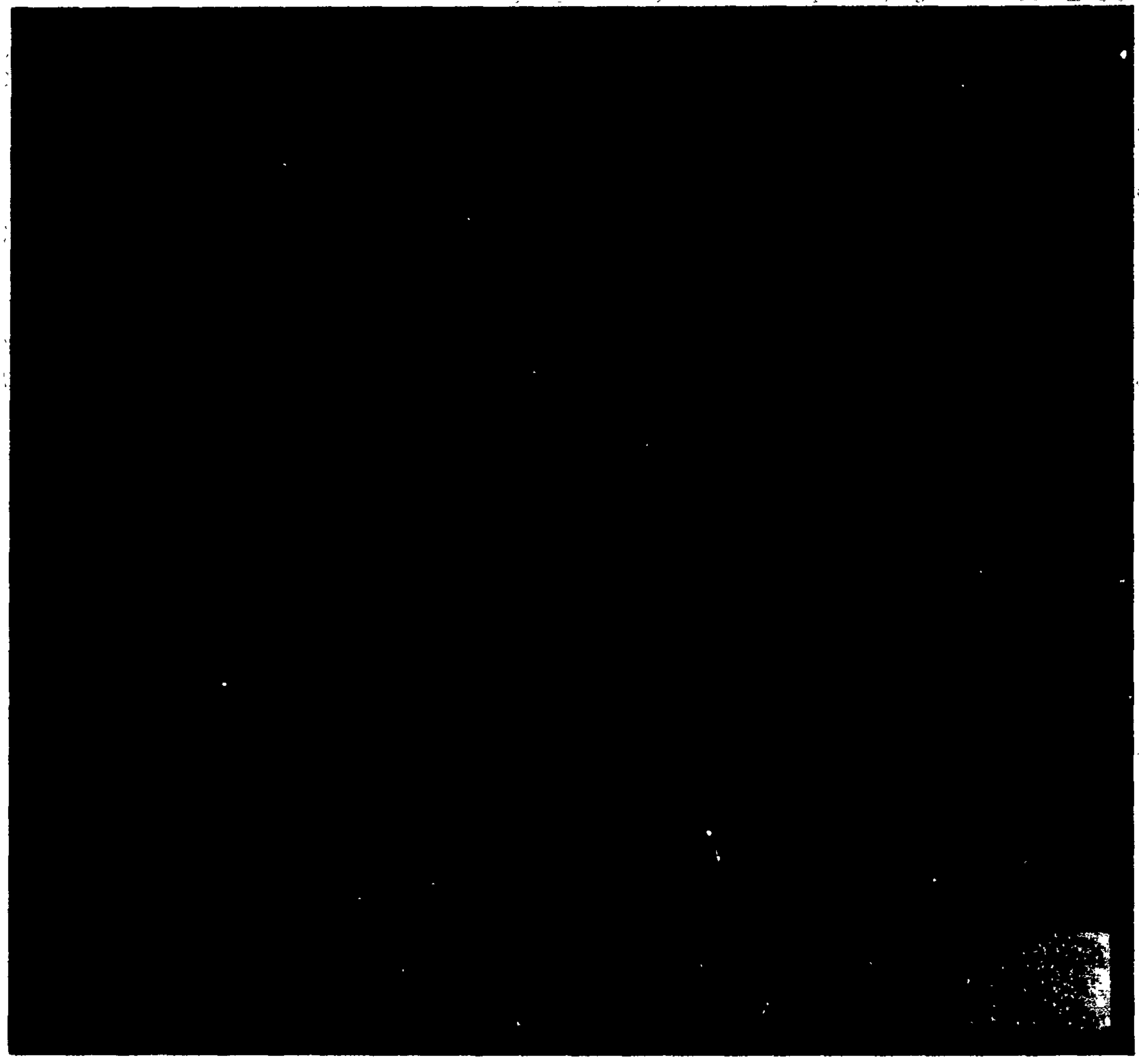


Figure 12(b). Sea surface temperature false colour satellite imagery from CSIRO Division of Atmospheric Research, Aspendale Victoria for 18 March,1986 coinciding with sections of SEAMAP 3 summer survey (RANRL 1/86) route A

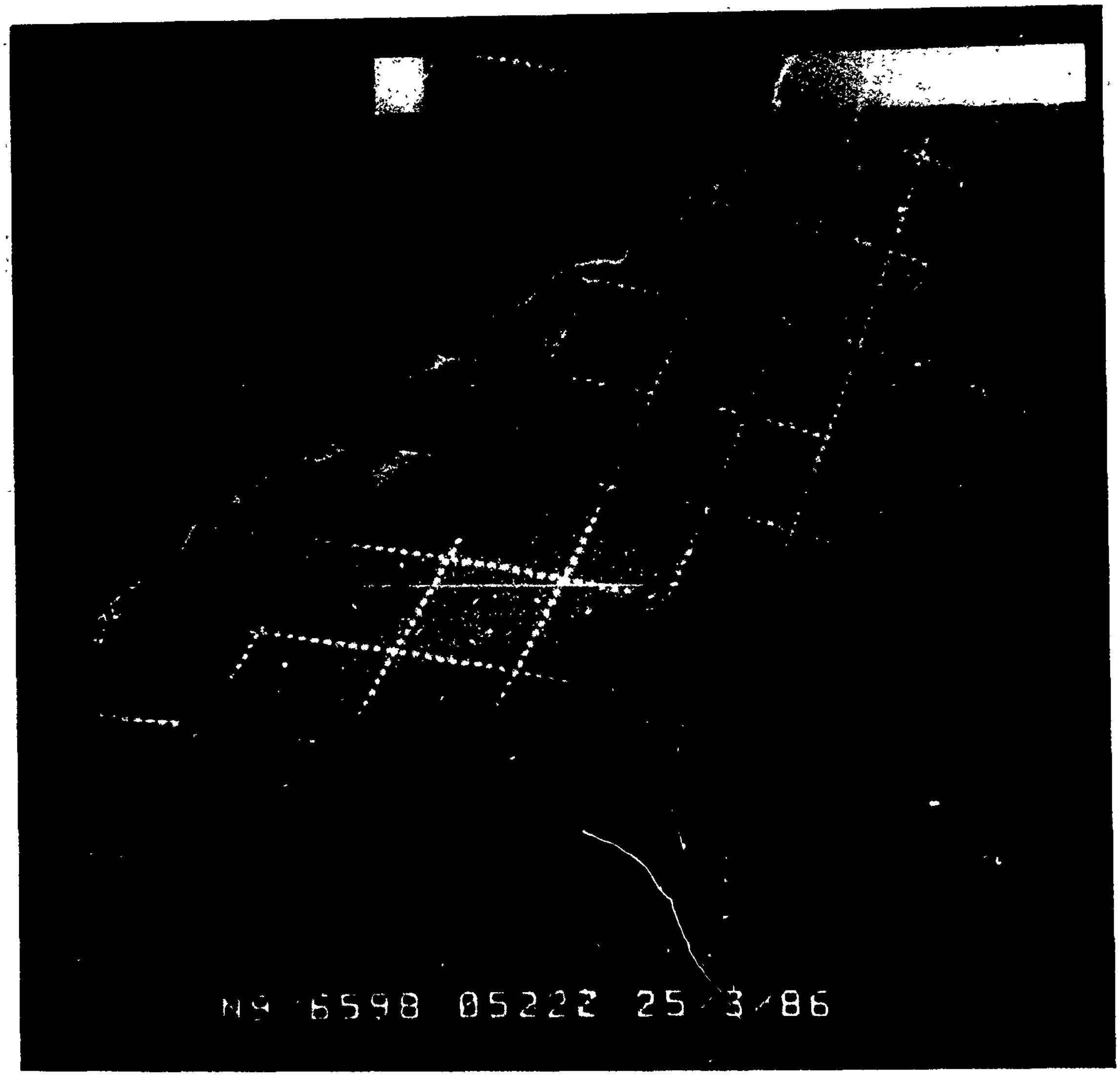


Figure 12(c). Sea surface temperature false colour satellite imagery from CSIRO Division of Atmospheric Research, Aspendale Victoria for 25 March 1986 coinciding with sections of SEAMAP 3 summer survey (RANRL 1/86) route A

Bathymetry (figures 14, 23) (Also see figures 17, 26)

The sections are drawn from hourly observations from either the centre beam of the Stabilised Narrow Beam Echo Sounding System (SNBESS) or a Precision Depth Recorder (PDR). In cases where depth was not available, eg when depth was lost because of rough sea conditions, depth is taken from GEBCO chart 5.10 (General Bathymetric Charts of the Oceans published by the Canadian Hydrographic Service, Ottawa, Canada). GEBCO values are marked with a G. Features such as seamounts are named where possible but since the bathymetry is self explanatory no further descriptions will be made. The sections are smoothed interpretations showing major features, not detailed bathymetric data.

Temperature and salinity cross sections

XBT Temperature cross sections

Sydney to VCTOD station 18 (figures 13 and 19)

Three warm core eddies or meanders of the EAC are crossed from Sydney to 160°E with the third being the strongest feature, and more intense on the western side. A fourth broader and weaker warm core feature is crossed from 163 to 168°E. Other warm core features occur about 173°E and 178°30'E. XBTs are widely spaced over most of the section. Deeper isotherms tend to become elevated from west to east, indicating a general weakening of flow along the section, compared to the deeper penetration of the East Australian Current system.

Station 14 to Auckland/Auckland to station 17 (figure 18)

Figure 18 shows a north-south section from station 14 to northwest of Auckland, and the return to the main SEAMAP route from northwest of Auckland to station 17. The surface current component is to the east at station 16, with coldest subsurface waters at XBT 68 (south of station 16). Flow direction is to the west south of XBT 68 according to the slope of isotherms, which is contrary to the summer flow direction shown in this area by Heath (1985) (his figure 10), for 9 years of summer stations. The overall surface circulation pattern is difficult to infer from this data, and will be discussed later in the section on geostrophic currents. Note that the section from XBT 71 to station 19 can be combined with the next section to form a cross-section from northwest of Auckland to Samoa.

Text continued on 30

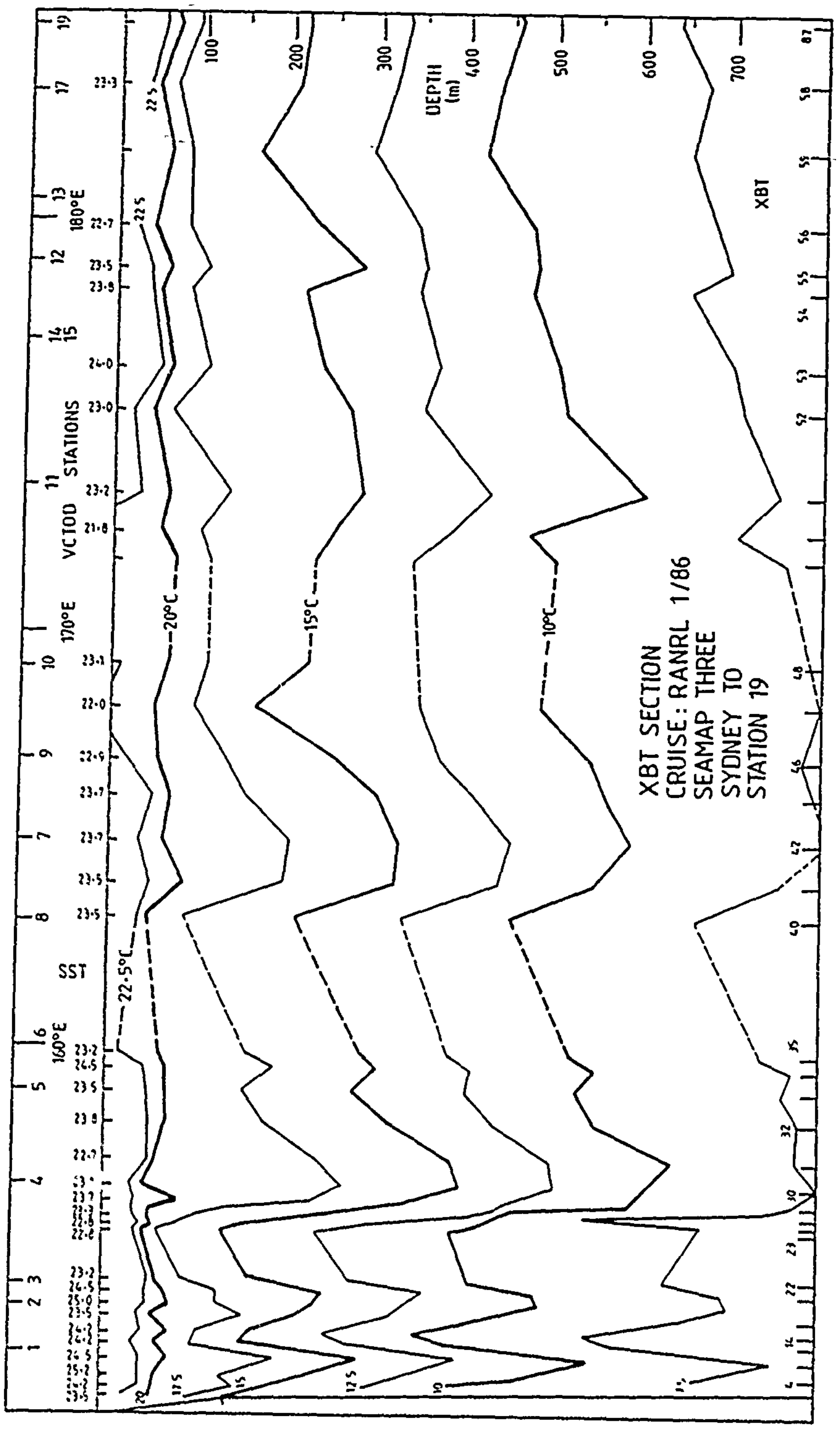


Figure 13. XBT temperature section from Sydney to station 19 (30°30'S, 175°W) for 28 January to 22 February 1986. Summer survey SEAMAP 3 (RANRL 1/86) route A. (See figure 19 for a continuation of this section to station 18)

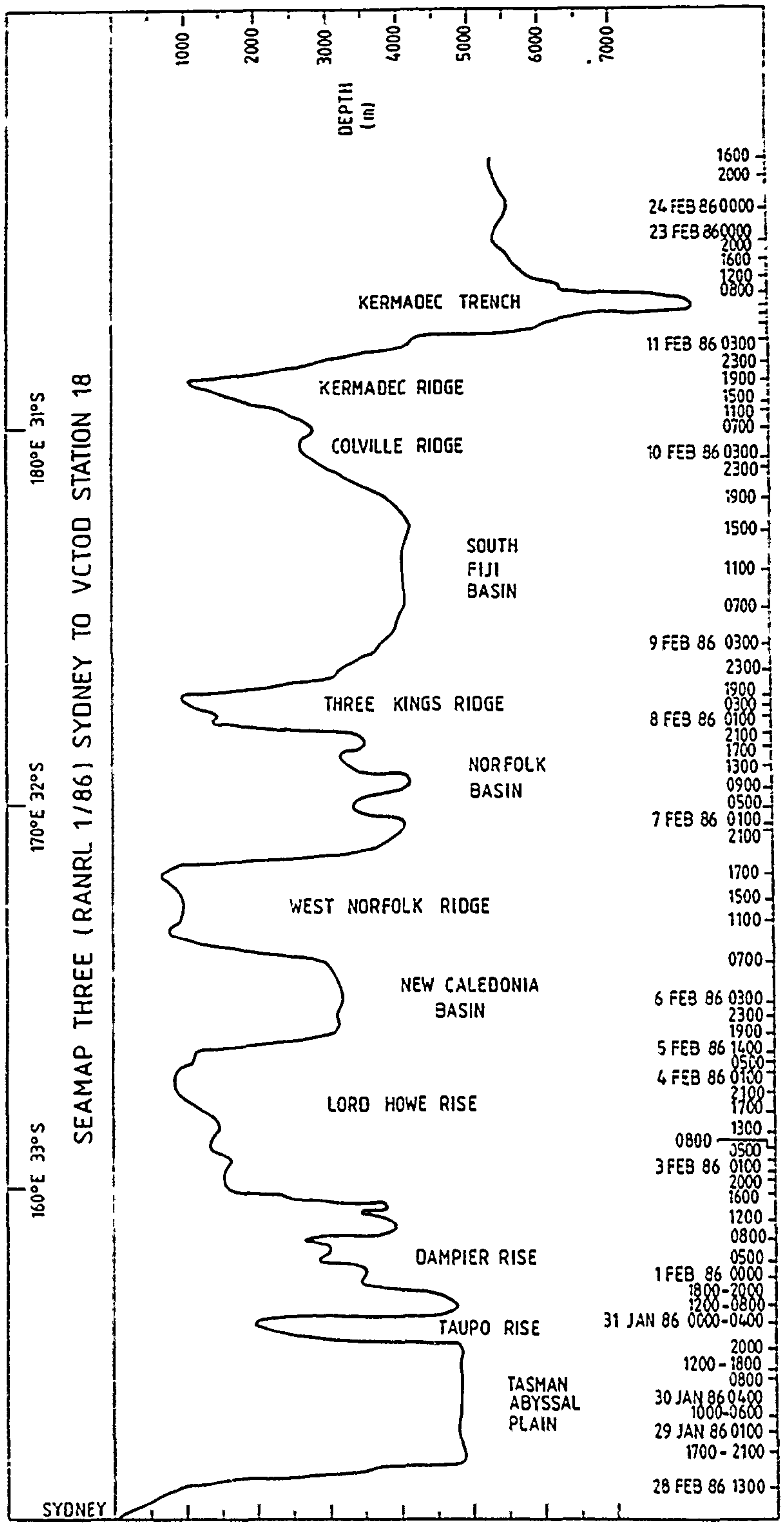


Figure 14. Bathymetry from Sydney to station 18. Summer survey SEAMAP 3 (RANRL 1/86) route A

Station 19 to Samoa (figure 19)

Isotherms above 300 m are depressed from 28°S to 14°S, and below 300 m become elevated, indicating a west to east surface current component of flow, and an east to west subsurface current component respectively. From 30 to 28°S waters appear to have a west to east current component. A dip in subsurface isotherms about XBTs. 90 and 91 occurs between two seamounts, the Osbourn seamount being located between XBTs 91 and 92.

Samoa to Sydney (figures 20, 21, 22)

Isotherms at temperatures lower than 15°C become depressed from north to south until the uplift caused by a cold feature between the two warm core eddies or meanders situated at XBT 209 and XBT 166. Above this temperature isotherms become elevated from north to south as more temperate surface waters are encountered. Warm 36. surface waters are seen to the west of Norfolk Ridge between stations 27 and 28, but with no deep subsurface expression. However isotherms below 300 m begin to deepen, with a pronounced dip in the 7.5°C isotherm from 700 to 800 m at station 28. This feature is confirmed in the VCTOD temperature section of figure 24. The salinity section (figure 25) indicates that at 800 m and deeper it may be related to the meeting of a cooler, lower salinity branch of Antarctic Intermediate Water (AAIW) from the east meeting warmer, higher salinity western AAIW waters of the Tasman Sea. The subsurface dip in isotherms occurs east of the Lord Howe Rise and parallel with a channel of 1500 to 2000 m depth through the rise, the channel sloping from north-west to south-east. The feature could be interpreted as the effects of the channeling of a deep flow from the west through the rise, which then loops south along the rise and which is skewed in the vertical from north to south. Warm waters occur at station 31 between Dampier Ridge and Lord Howe Rise. The East Australian Current is crossed from 155°E into the coast. Subsurface isotherms south of Fiji indicate eastward flow to below 200 m, with deeper flow then to the west.

VCTOD temperature and salinity sections

Sydney to Station 19 (figures 15, 16, 17)

The broader scale temperature section to 2000 m shows that the warm feature west of the Lord Howe Rise penetrates to at least 1900 m. The salinity is not well calibrated but also shows this feature and a second west of the Norfolk Ridge. Highest salinity occurs as a subsurface maximum at 100 to 200 m from 150 to 170°E, then at the surface. The surface area from stations 11 to 19 is the formation area for the waters of the salinity maximum (Subtropical Lower Water, Wyrtki (1962)). Lowest salinities for the section occur in the minimum of the Antarctic Intermediate Waters (AAIW) at 1000 m. The minimum has different values on either side of the Lord Howe Rise, indicating separate branches of the AAIW. Wyrtki (1962) describes AAIW as entering the Tasman Sea from the south between Tasmania and New Zealand, and from the

north between Fiji and New Zealand. The latter inflow comes from a strong northward flow of AAIW around Chatham Rise, with one branch entering the Tasman, and a second branch flowing north-westward between New Caledonia and New Hebrides (Vanuatu). The Niskin bottle salinities of less than 34.40 PSU in the eastern branch, and 34.45 PSU north of 40°S in the western branch agree with Wyrtki's salinity figures.

The salinity minimum is noticably deeper and colder between the Colville Ridge and the Kermadec Islands (VCTOD sites 12 and 13). A lower salinity value would indicate a more southern origin than surrounding waters, but the value is higher. Marked salinity and temperature perturbations occur about the salinity minimum for stations 9 to 11, 14/15, and 17. These allow investigations of AAIW flow and mixing which will be discussed in a separate report (Hamilton, 1990).

From Sydney to 166°E, deep temperature and salinity sections (figure 17) show Antarctic Bottom Water (AABW) at the foot of the Australian continental slope and west of the Taupo Seamount. A local salinity maximum occurs along the 3000 m level (of Atlantic origin eg Wyrtki, 1962).

Samoa to Sydney (figures 24, 25, 26)

Two branches of the AAIW are seen in the salinity section as minima of different values. The branch from the east has a higher salinity and occurs at lesser depths in the north than the AAIW seen in the section from Sydney to station 19. Several local minima occur at station 22, perhaps evidence of splitting of the flow into several paths by the broken topography of the upper Lau Ridge, or meeting and mixing of different water masses. Station 20 also shows marked temperature and salinity perturbations about the Antarctic Intermediate salinity minimum. The upper salinity maximum occurs as a subsurface feature at about 200 m, except near station 28 where the maximum occurs close to the surface in conjunction with the warmer waters west of the Norfolk Ridge. Stations 27 and 28 show further perturbations about the salinity minimum. These can be explained by current interactions, but will not be discussed in detail in this report, although more details are given when discussing VCTOD profiles (page 47). Deep sections from Sydney to the Lord Howe Rise (figure 26) show the upper salinity maximum at the surface at station 34, associated with the warm surface waters of the East Australian Current. A local maximum is seen at about 3000 m. Cold Antarctic Bottom Water is situated near the foot of the Australian continental slope.

Text continued on page 45

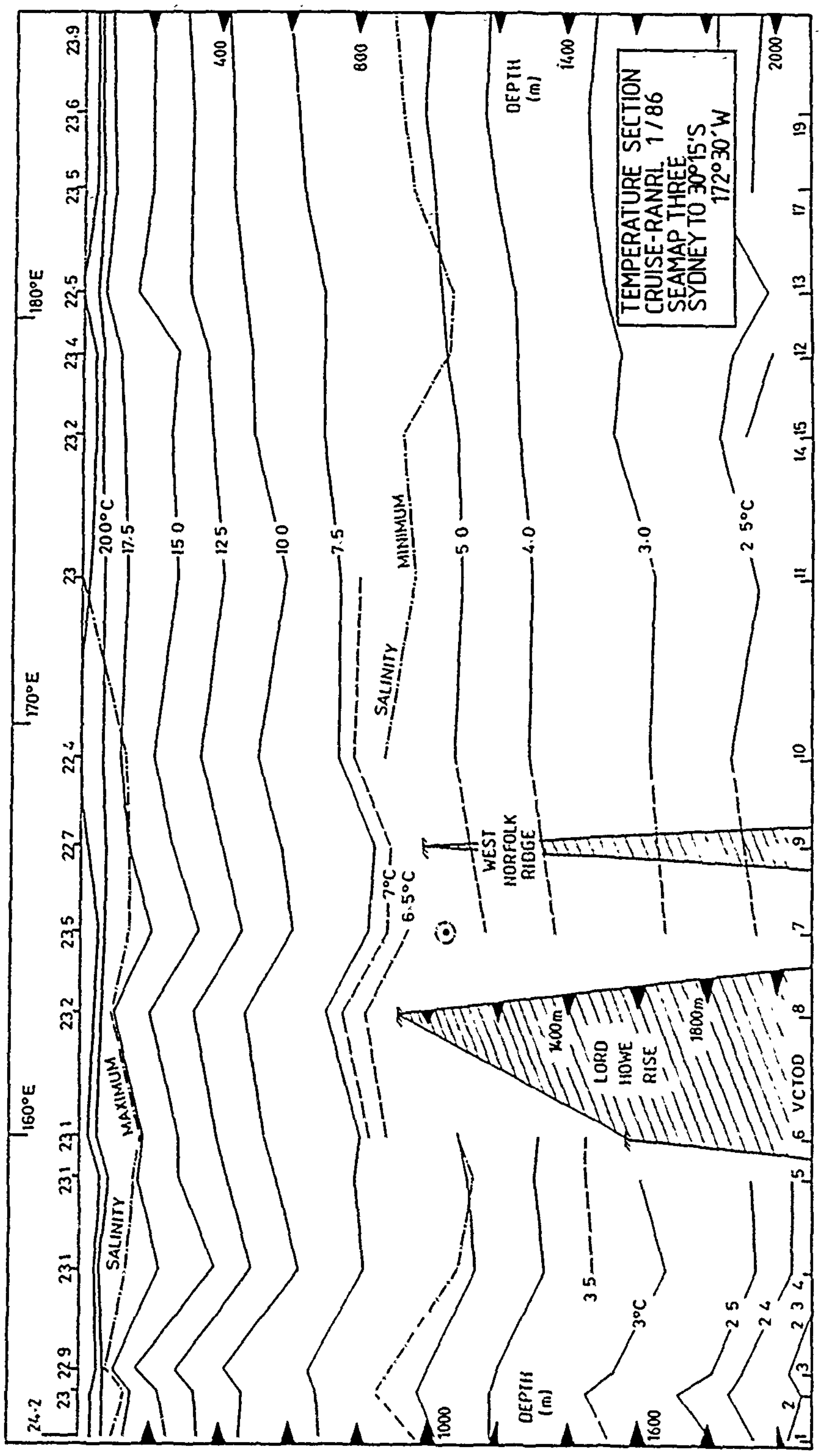


Figure 15. VCTOD temperature section to 2000 m from Sydney to station 18 (30°15'S, 172°30'W) for 28 January to 23 February 1986. Summer survey SEAMAP 3 (RANRL 1/86) route A

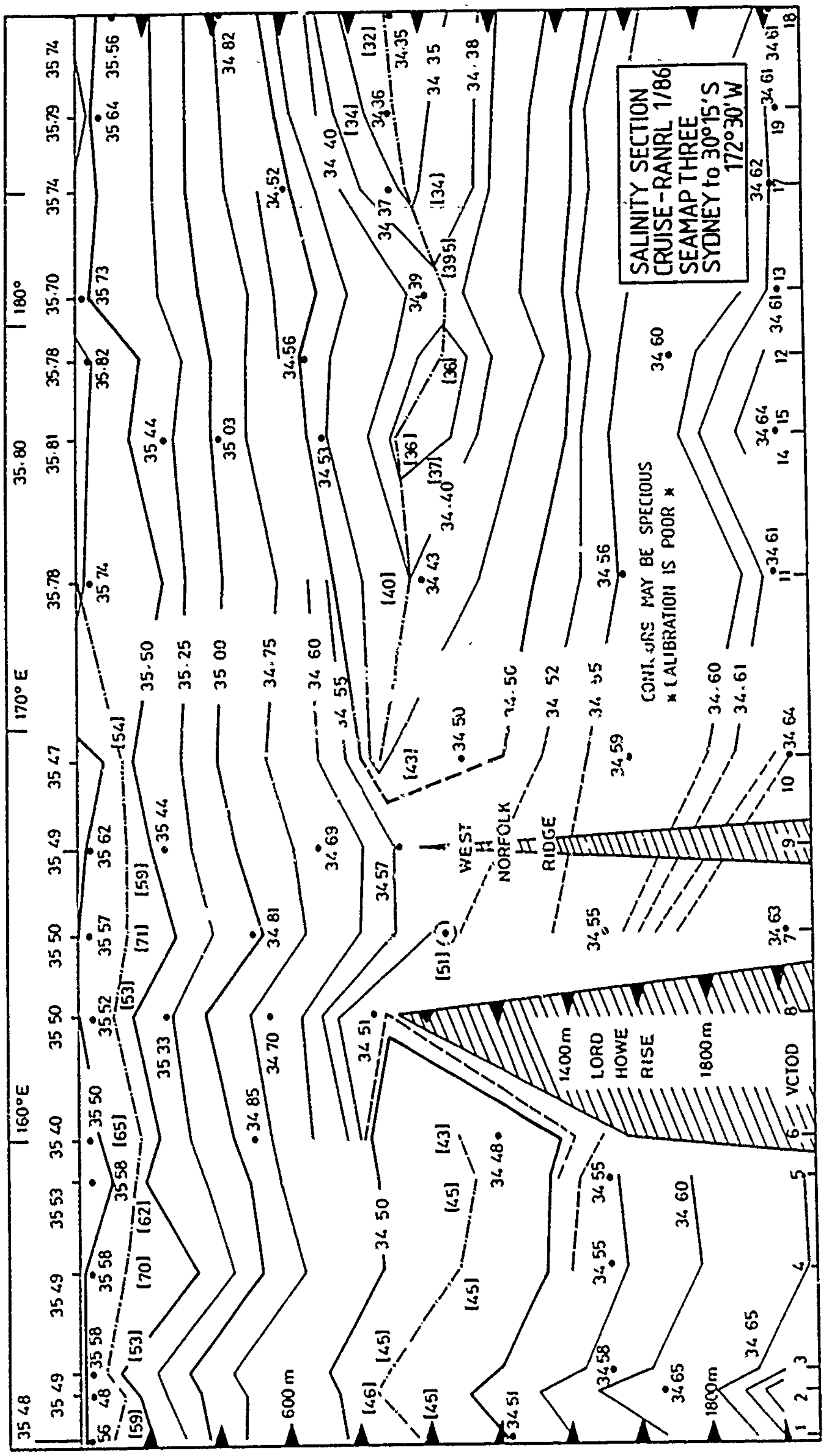


Figure 16. VCTOD salinity section to 2000 m from Sydney to station 18 (30°15'S, 172°30'W) for 28 January to 23 February 1986. Summer survey SEAMAP 3 (RANRL 1/86) route A. (The points . 34.55 are Niskin bottle rosette mounted samples. Salinity calibration is not very good in terms of modern instrumentation. Contours are for downcast values. The Niskin sample values shown are for upcasts). [ ] show the AAIW salinity minimum values

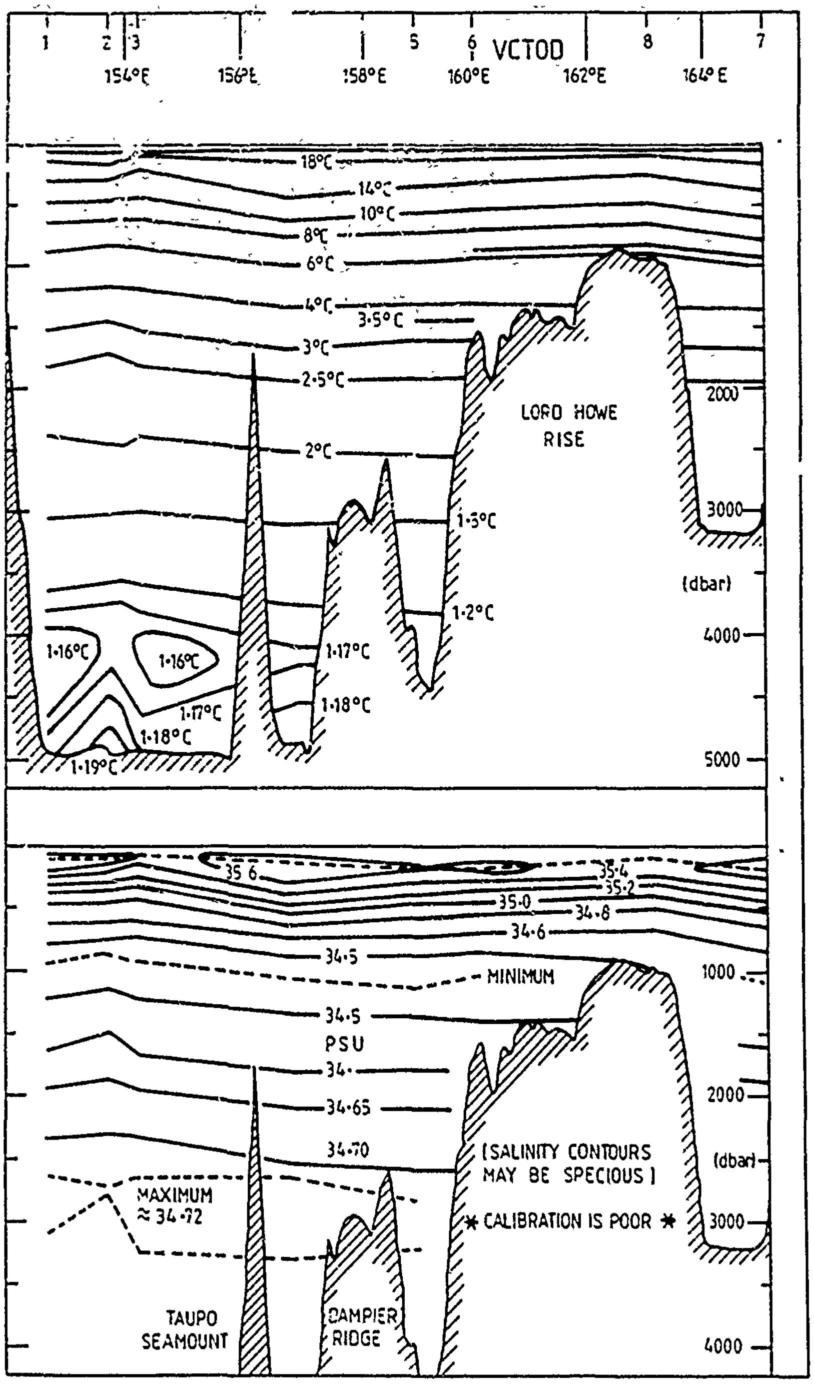


Figure 17. Deep VCTOD temperature and salinity sections from Sydney to east of Lord Howe Rise for 28 January to 4 February 1986. Summer survey SEAMAP 3 (RANRL 1/86) route A. (See figure 26 for the inbound leg)

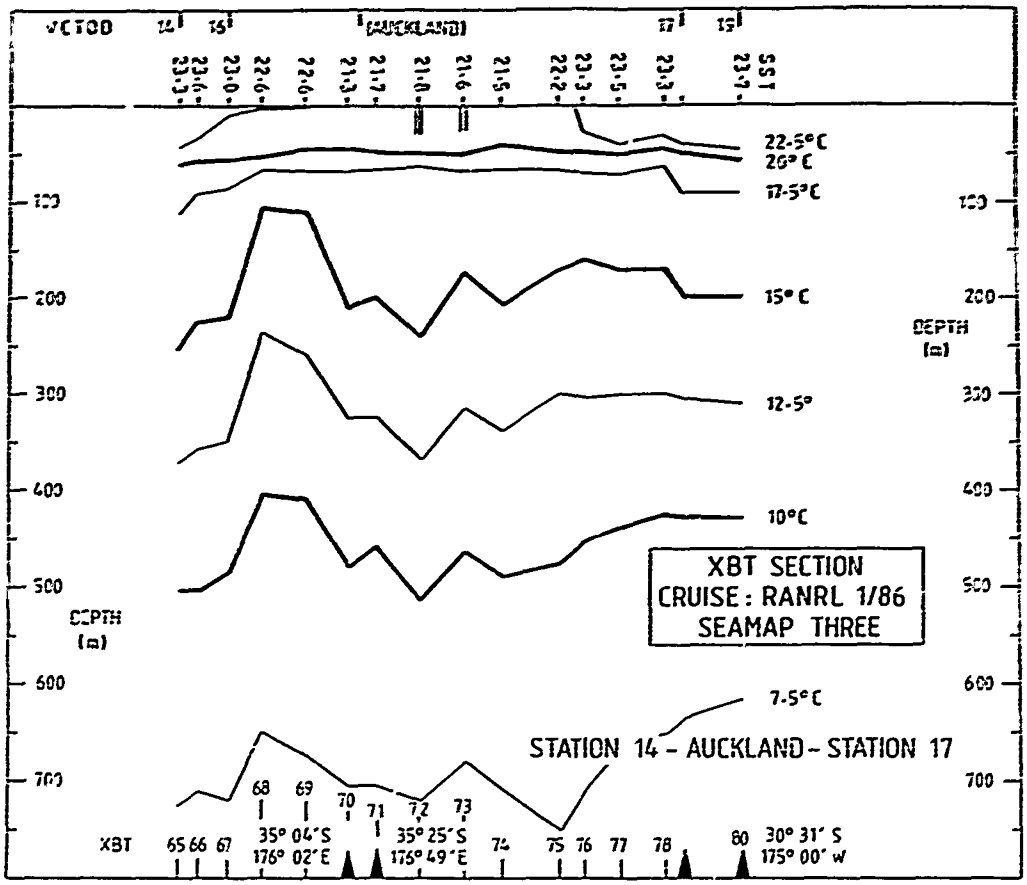


Figure 18. XBT temperature sections from Auckland to the SEAMAP route A for summer survey SEAMAP 3 (RANRL 1/86). From 13 to 22 February 1986

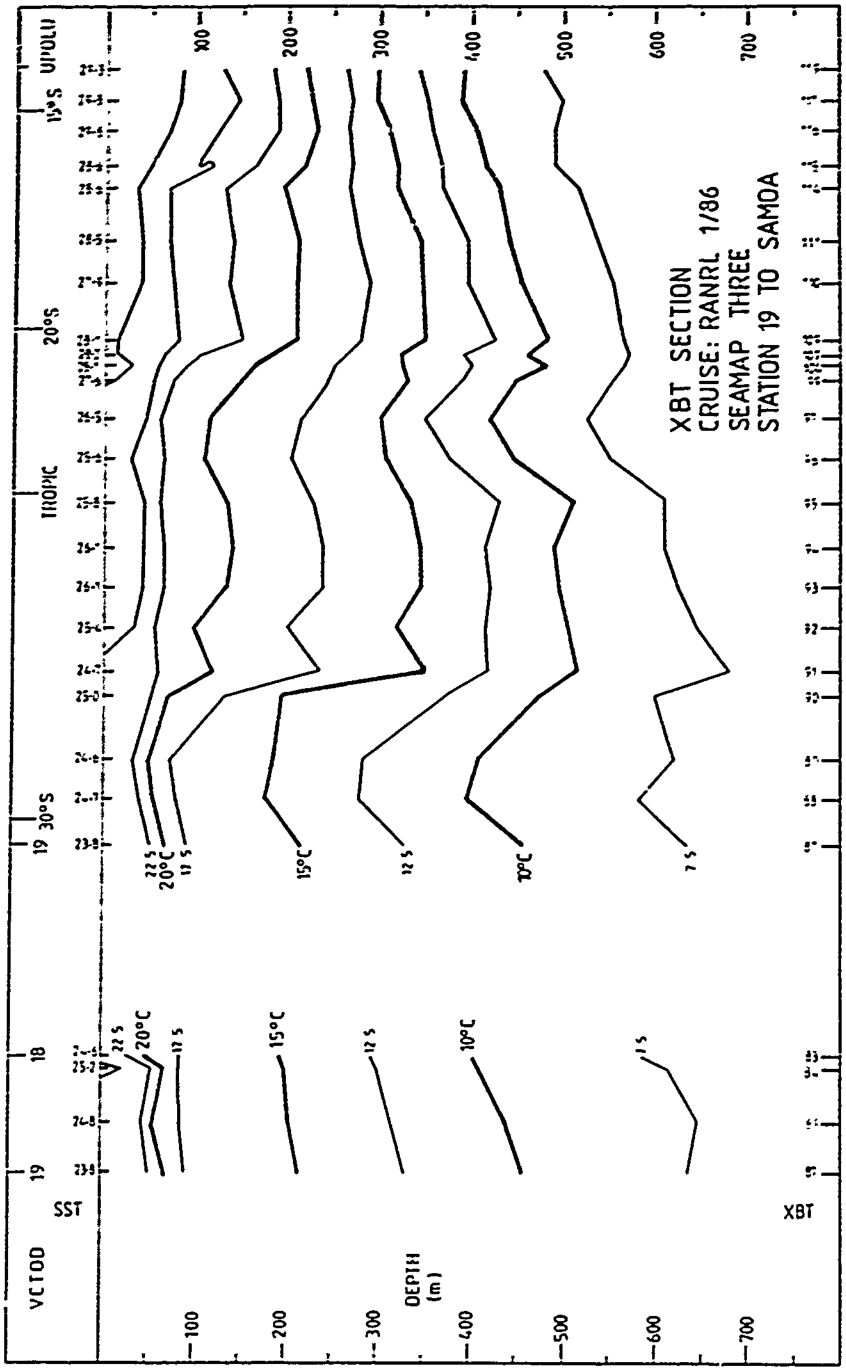
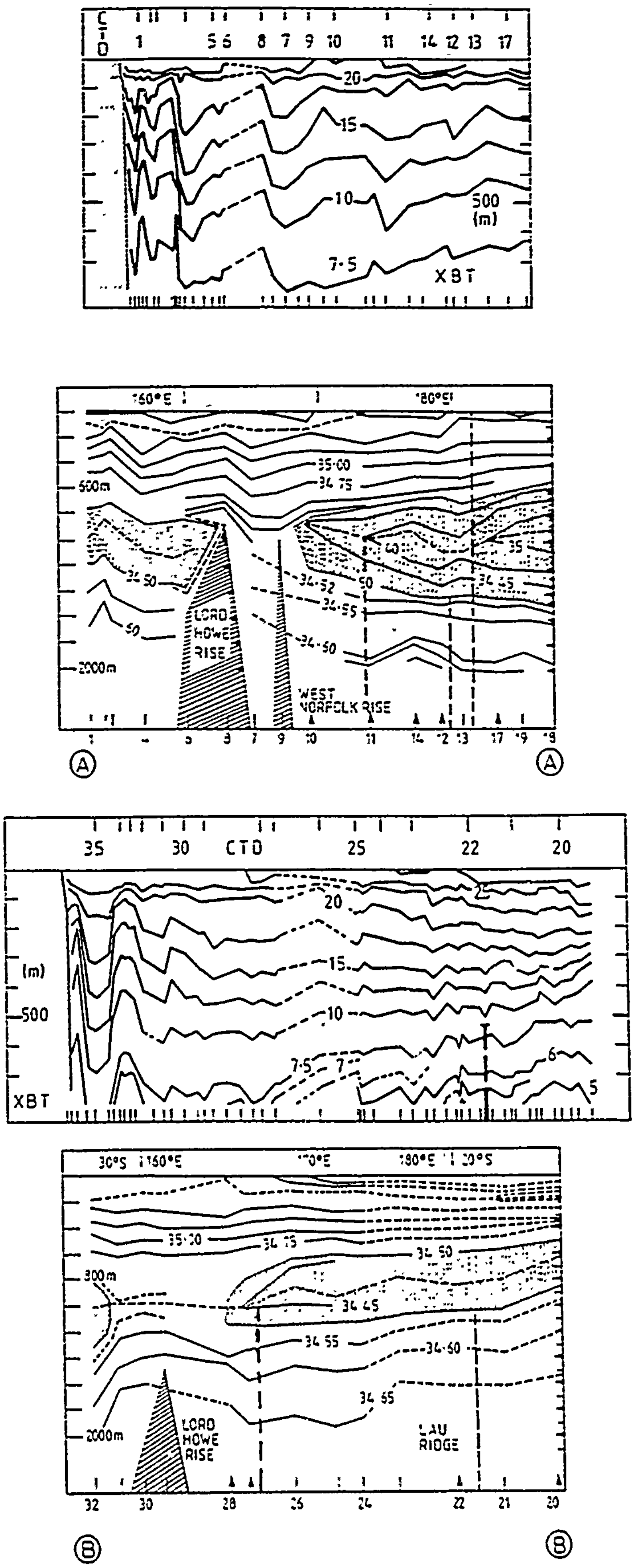


Figure 19. XBT temperature section from station 19 (30°30'S, 175°W) to Samoa for summer survey SEAMAP 3 (RANRL 1/86) route A. From 23 to 27 February 1986. (This completes a section from north-east of Auckland to Samoa started in figure 18)



Figures 13, 16, 20 to 21, 25 in reduced format. This figure grouping shows two branches of Antarctic Intermediate Water about the Lord Howe Rise. Thick dashed vertical lines are ridges.

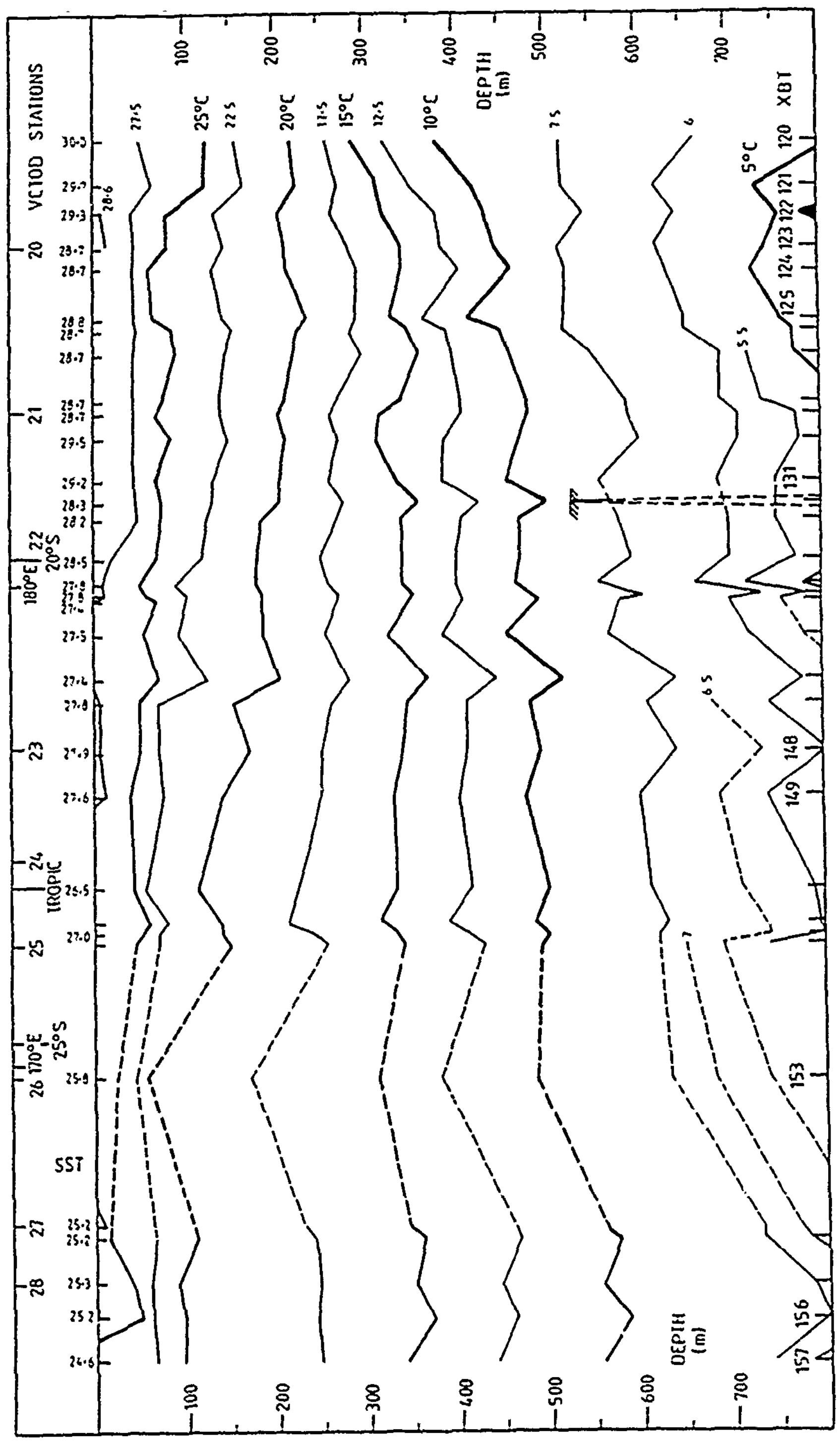


Figure 20. XBT temperature section from Samoa to station 28 along SEAMAP route A for summer survey SEAMAP 3 (RANRL 1/86). From 3 to 15 March 1986. (See figure 23 for bathymetry section)

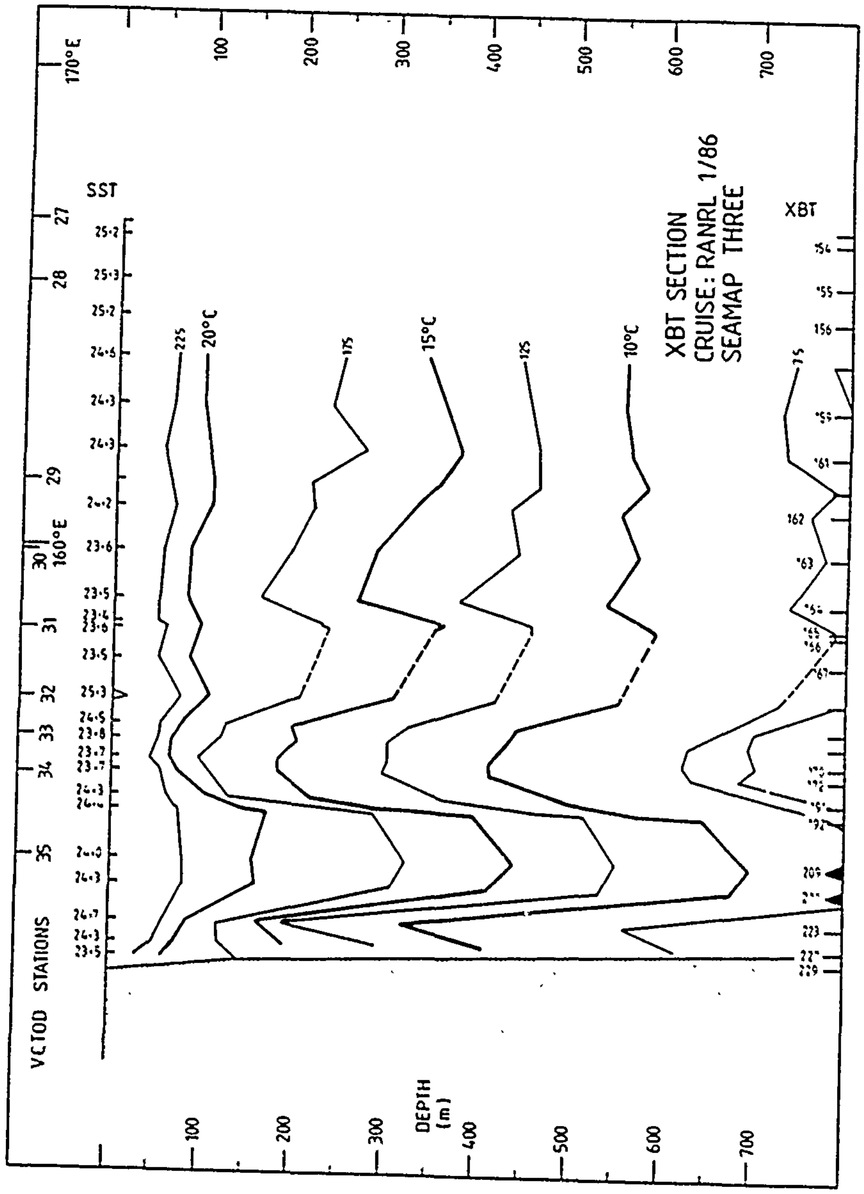


Figure 21. XBT temperature section from station 26 to Sydney along SEAMAP route A for summer survey SEAMAP 3 (RANRL 1/86). From 15 to 25 March 1986. (See figure 23 for bathymetry section)

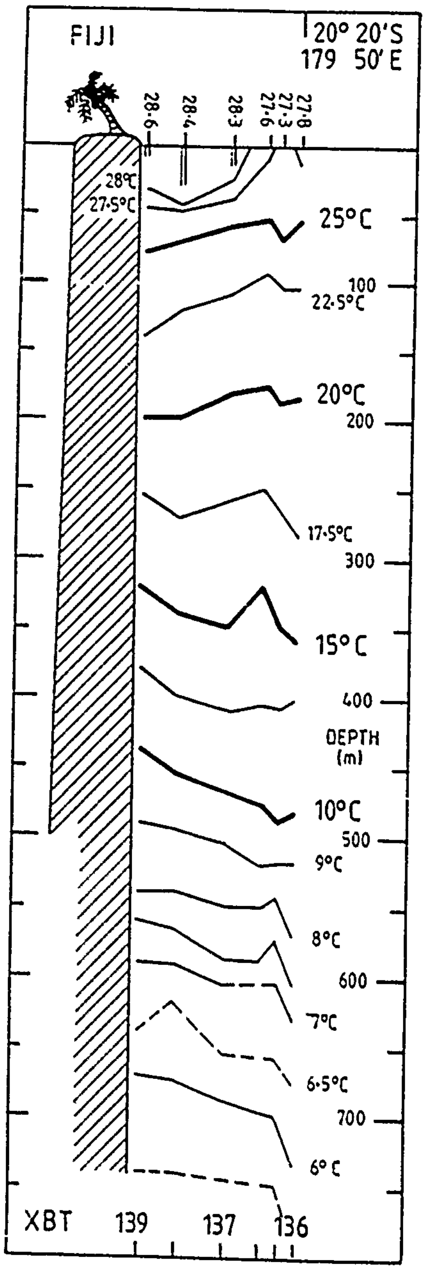


Figure 22. XBT temperature section from SEAMAP route A to Fiji (20°20'S, 179°50'E) on 10 March 1986. Summer survey SEAMAP 3 (RANRL 1/86) route A

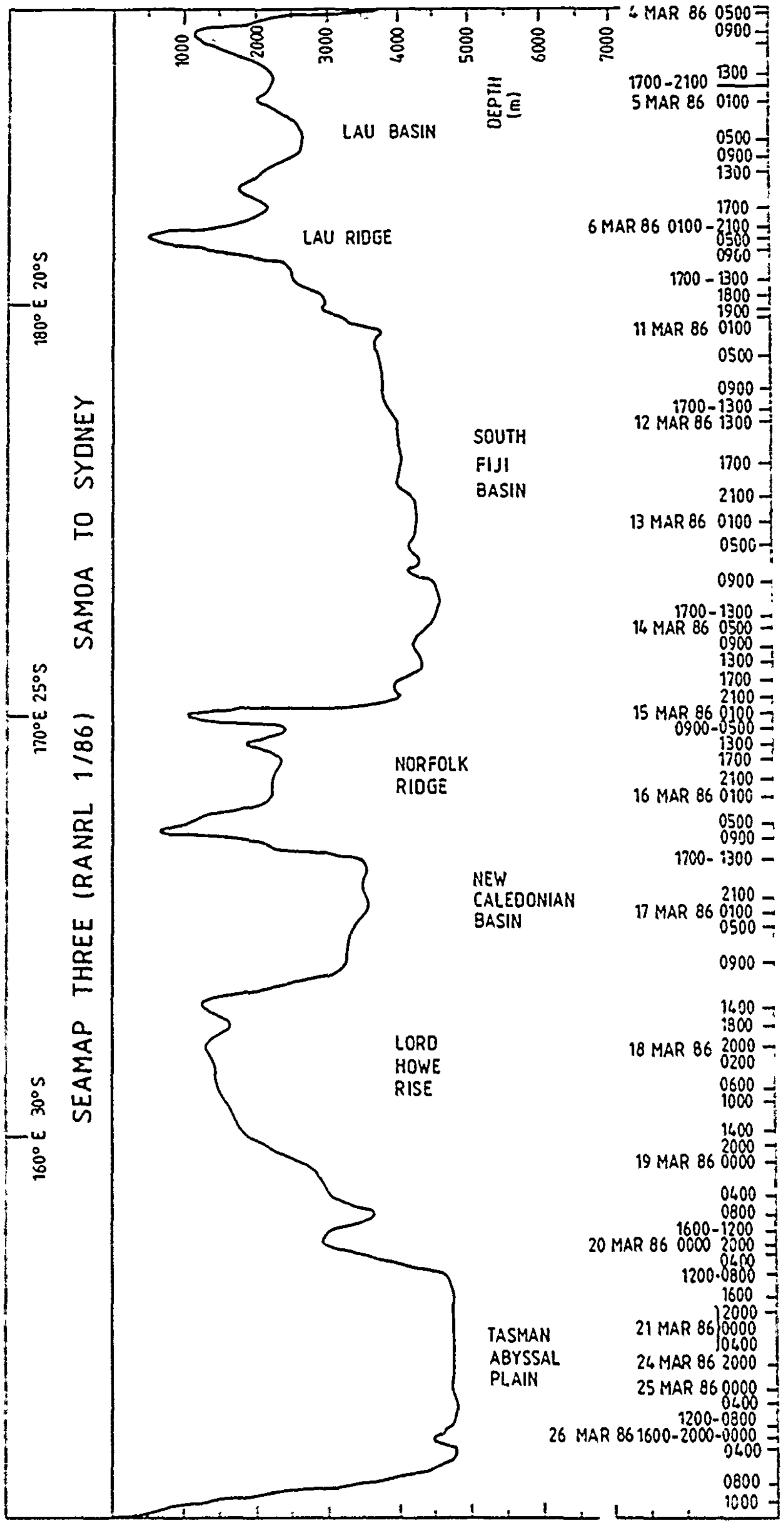


Figure 23. Bathymetry from Samoa to Sydney. Summer survey SEAMAP 3 (RANRL 1/86) route A

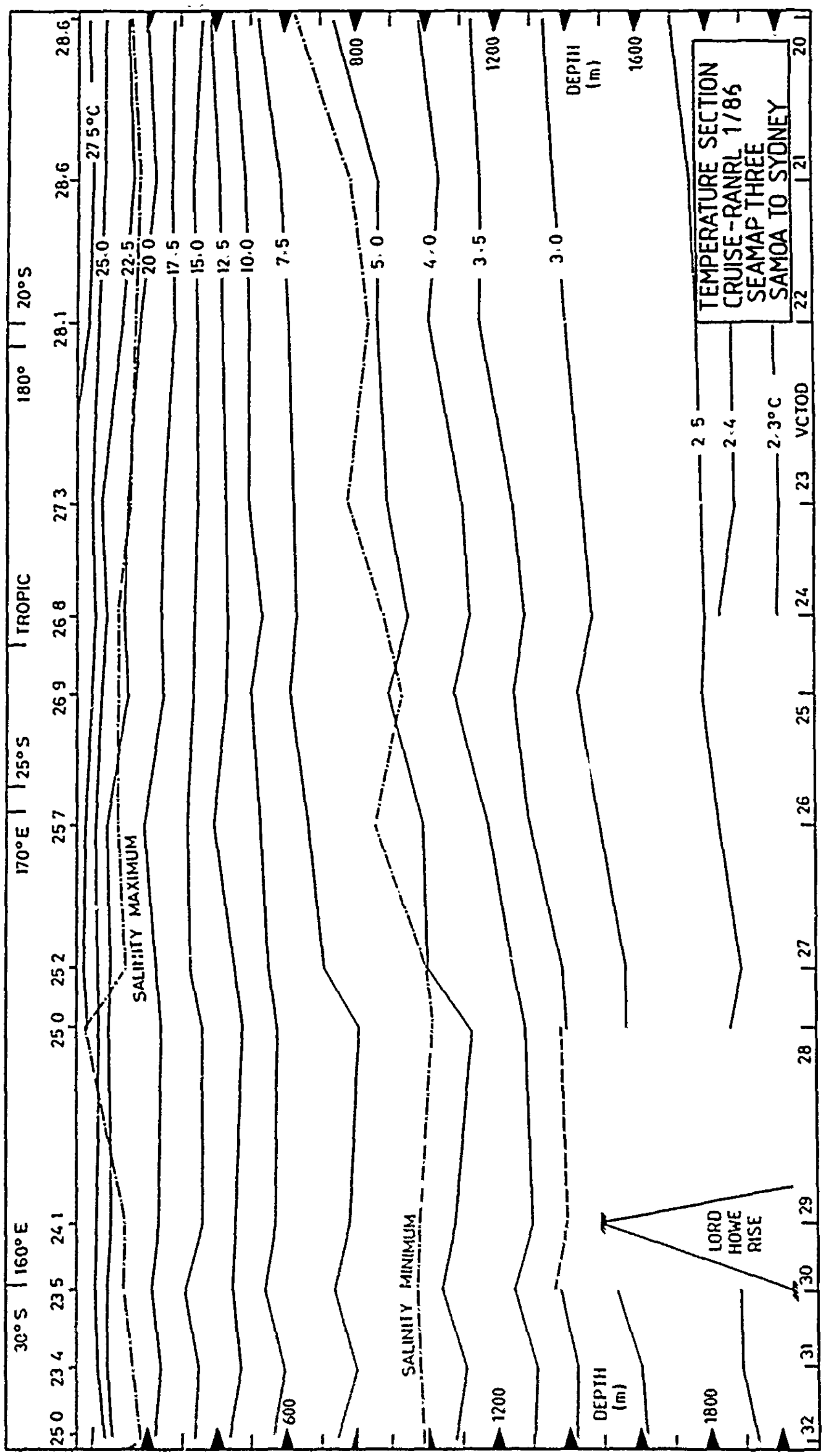


Figure 24. VCTOD temperature section to 2000 m from Samoa to Sydney for 3 to 25 March 1986. Summer survey SEAMAP 3 (RANRL 1/86) route A

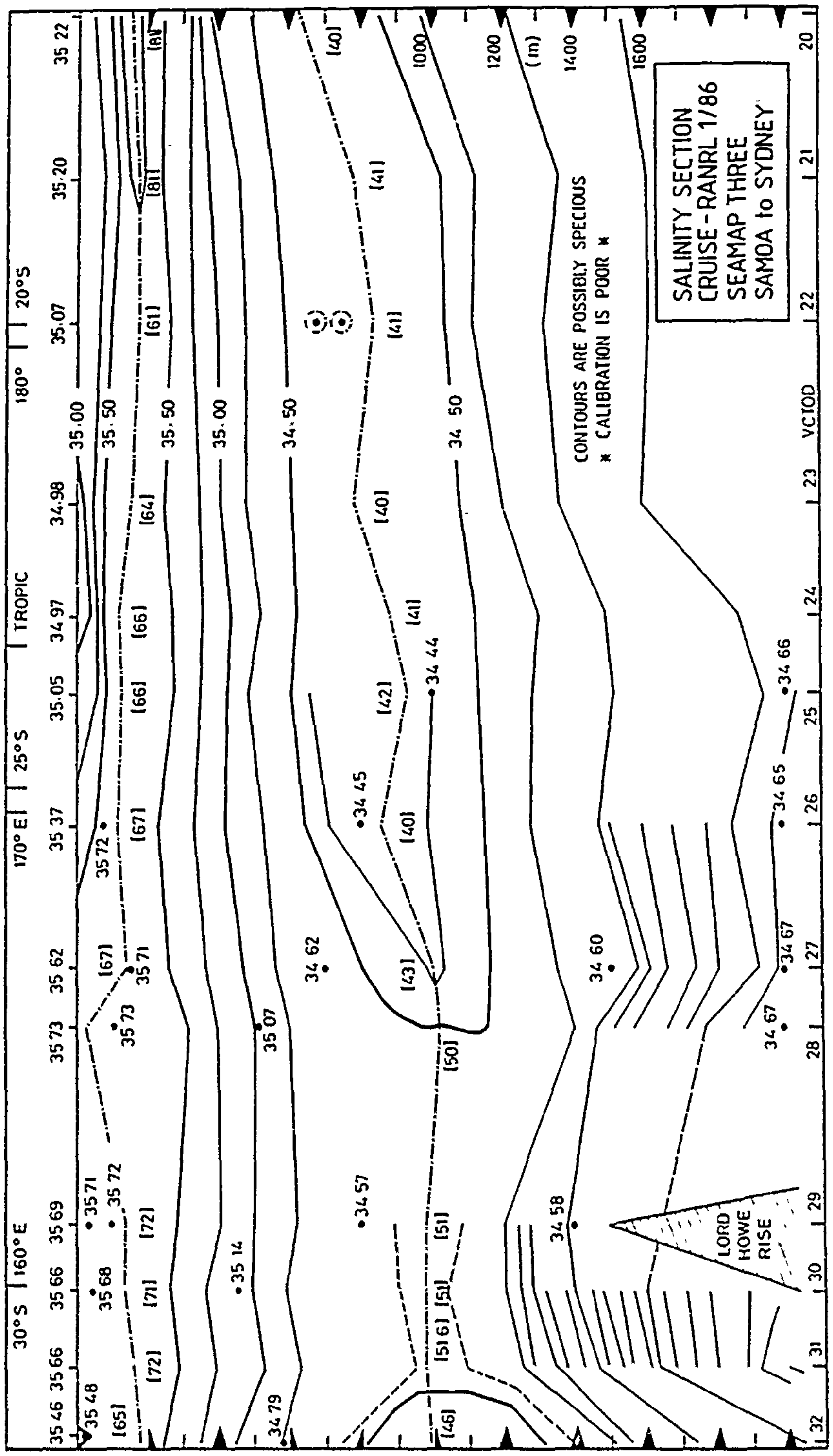


Figure 25. VCTOD salinity section to 2000 m from Samoa to Sydney for 3 to 25 March 1986. Summer survey SEAMAP 3 (RANRL 1/86) route A. The points . 34.57 are Niskin bottle rosette mounted samples. Salinity calibration is not very good in terms of modern instrumentation. Contours are for downcast values. The Niskin samples shown are for upcasts). [ ] show AAIW minimum salinity values

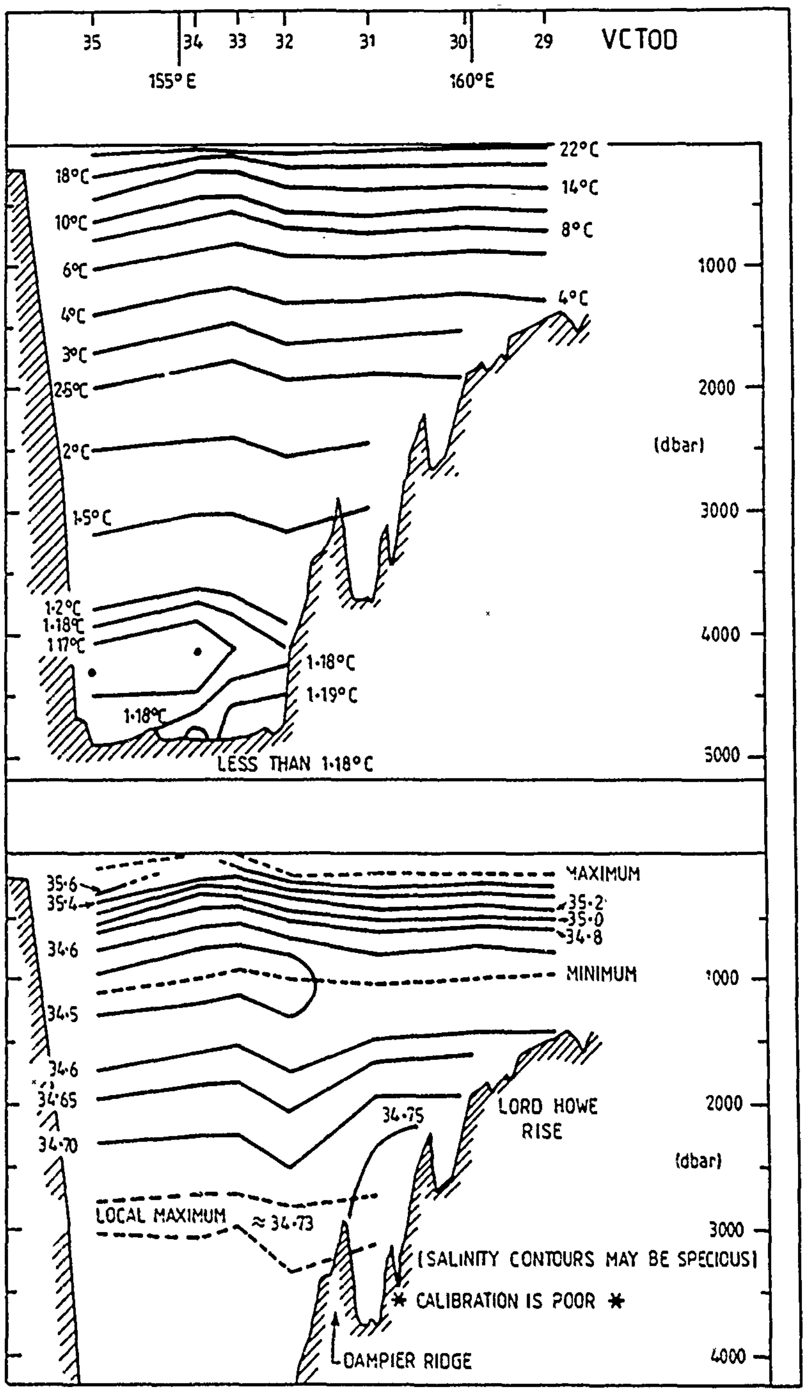


Figure 26. Deep VCTOD temperature and salinity sections from Lord Howe Rise (20°20'S, 161°15 E) to Sydney for 18 to 25 March 1986. Summer survey SEAMAP 3 (RANRL 1/86) route A. (See figure 17 for the outward leg)

Nansen station data listings and profiles

Nansen stations were not occupied on this cruise.

VCTOD station data listings and profiles

Thirty-five CTD stations were occupied nominally to 2000 m, with stations to over 4500 m near the Australian coast, at the sites shown in figure 6. A rosette sampler was used to obtain four Niskin bottle samples for each of the first thirty-two stations, but Niskin salinity values for stations 20 to 24 were rejected. No calibration data are available for stations 33 to 35, but checks can be made against the temperature-salinity polynomials given for this area by Pearce (1981).

Accuracy of salinity values for individual stations on this cruise are expected to range from 0.01, at best, to 0.03 salinity units, or worse. Differences between pairs of stations could therefore be higher than 0.06 salinity units. Sets of stations appearing to have the same conductivity calibration are:

3, 4	5, 6	13, 14	15, 17, 18, 19
20 to 23	25 to 31	33 to 35	

Listings and profiles are given after page 53. Tables of Niskin/rosette sampler values for the upcasts are given after the station listings (pages 76 to 78). Temperature and salinity cross-sections have been discussed earlier. Plots of the profiles highlight other structures eg the salinity profile for station 10 sited east of the West Norfolk Ridge, shows a perturbation towards lower salinities at the salinity minimum of the AAIW at 850 m. This may be associated with advection of cooler southern waters by the lower eastern side of the warm waters (see figures 13, 15, 16) situated just to the west of the West Norfolk Ridge, with both ridge and current acting as a westward barrier to the flow of this branch of the AAIW.

Stations 1 to 19 (Sydney to north-east of New Zealand)

The depth of the sound speed maximum in upper waters ranged from 10 to 40 m in the East Australian Current area from the coast out to 160°E. There was no surface duct over the remainder of the section, except for ducts of 20 to 30 m at stations 12 to 15. Nearly all surface ducts occurred when temperature mixed layers occurred, with summer surface heating preventing formation of a subsurface sound speed maximum elsewhere.

Bass Strait water is seen as temperature and salinity reversals in several of the stations eg at 400 m in station 2 (page 55) and 350 m in station 7 (page 59), and deeper temperature inversions also occur. Station 9 shows temperature inversions at 650 m, between 800 and 850 m, mixed or near mixed layers between 770 to 790 m, and about 850 m. These features may indicate interactions with the West Norfolk Ridge, flow associated with the ridge, or the meeting of deeper currents about the ridge. Station 10 also exhibits a temperatures inversion at about 800 m, and profile irregularities from 650 to 900 m. This coincides with

an 'intrusion' of some part of the eastern branch of the AAIW salinity minimum (figure 25), and indicates a mixing area for this branch with waters from the west. The AAIW salinity minimum of this branch has several local minima in station 11 from 1100 to 1300 m, indicating it arrives there in an irregular manner. Station 12 has an inversion at 250 m (temperature approximately 15.4°C). Stations 14 and 15 (same site) show perturbations in salinity at the AAIW minimum, as does station 17. Deeper inversions associated with the flow of the AAIW are discussed in Hamilton (1990).

Station 20 to 35 (Samoa to Sydney)

Sonic layer duct depths in the East Australian Current area range from 10 to 40 m from the Australian coast to 157°E. Station 28 showed a sonic layer duct depth of 40 m in the warmer waters west of Norfolk Ridge. Duct thicknesses were zero elsewhere except where temperature mixed layers occurred at stations 21 and 24. Station 20 shows a cooler, lower salinity reversal about 150 m in the core of the salinity maximum. These are possibly other components of the maximum or waters from a different source area. Station 22 has a salinity reversal situated about 720 m which appears as a higher salinity component in the AAIW minimum. This has been mentioned earlier as possible evidence of the Lau Ridge splitting flow of the AAIW into several paths. Station 20 shows marked perturbations at the level of the AAIW.

Station 23 shows a lower salinity component in the upper salinity maximum at 200 m. Stations 27 and 28 show perturbations in the AAIW salinity minimum. Stations 29 and 30 show temperature inversions at 370 m, and 280 m respectively, station 30 having another at 460 m. Station 31 has an inversion at 410 m. The salinity minimum of the AAIW profile for stations 30 onwards becomes smoother and rounded in the salinity profile. Station 34 has a large temperature inversion at 210 m.

The above perturbations are seen in an examination of the temperature profiles. Not all inversions are listed. In terms of water mass movements, many stations show evidence of complex interactions. The deeper inversions are discussed in Hamilton (1990).

Currents

Geostrophic current profiles between selected station pairs are shown in figure 27. The profiles in the East Australian Current area are often monotonically decreasing to over 4000 m, with no apparent level of no motion above this depth.

Surface currents calculated from the VCTOD data and inferred from the XBT temperature sections, and SST data, are shown in figure 28. Because of the poor salinity calibration, the current values are subject to error, but general features can be described. Highest current values are seen for the East Australian Current off Sydney. The XBT sections (figures 13 and 21) show several meanders so that the apparent geostrophic currents calculated can be in error, because of averaging of northward and southward currents. Figure 13 shows that stations 2 and 3 are

located on the eastern side of a meander, and can be expected to give a reasonable current value. The calculated value is half a knot to the north relative to the 2000 dbar level. SST isotherms (figure 10) also show recirculation to the north.

The highest current value is 1 kn south relative to 2000 dbar between stations 32 and 33. The XBT section (figure 21) also shows 'southward' flow, and shows the stations to be reasonably spaced with respect to flow structure. Southward flow between stations 8 and 7 can be related to the westward side of a warm feature in the XBT section (figure 13). Northward flow between stations 12 and 13 can be related to the eastward side of a meander of some sort seen in the XBT section (figure 13). This direction generally agrees with that expected from the rather broad patterns of SST isotherms in this area (figure 10).

Additional data

Figure 29 shows tracks of vessels deploying XBT in the CSIRO merchant ship programme for January to March 1986. The XBT are very widely spaced. The New Zealand vessel Kaharoa occupied CTD stations to 500 m between 33 to 36°S, 165 to 172°E from 7 to 29 March. Mechanical bathy-thermograph profiles were taken from 33 to 30°S, 168°E and at other locations (Bailey, 1986 - Fisheries Management Division NZ).

Text continued on page 53

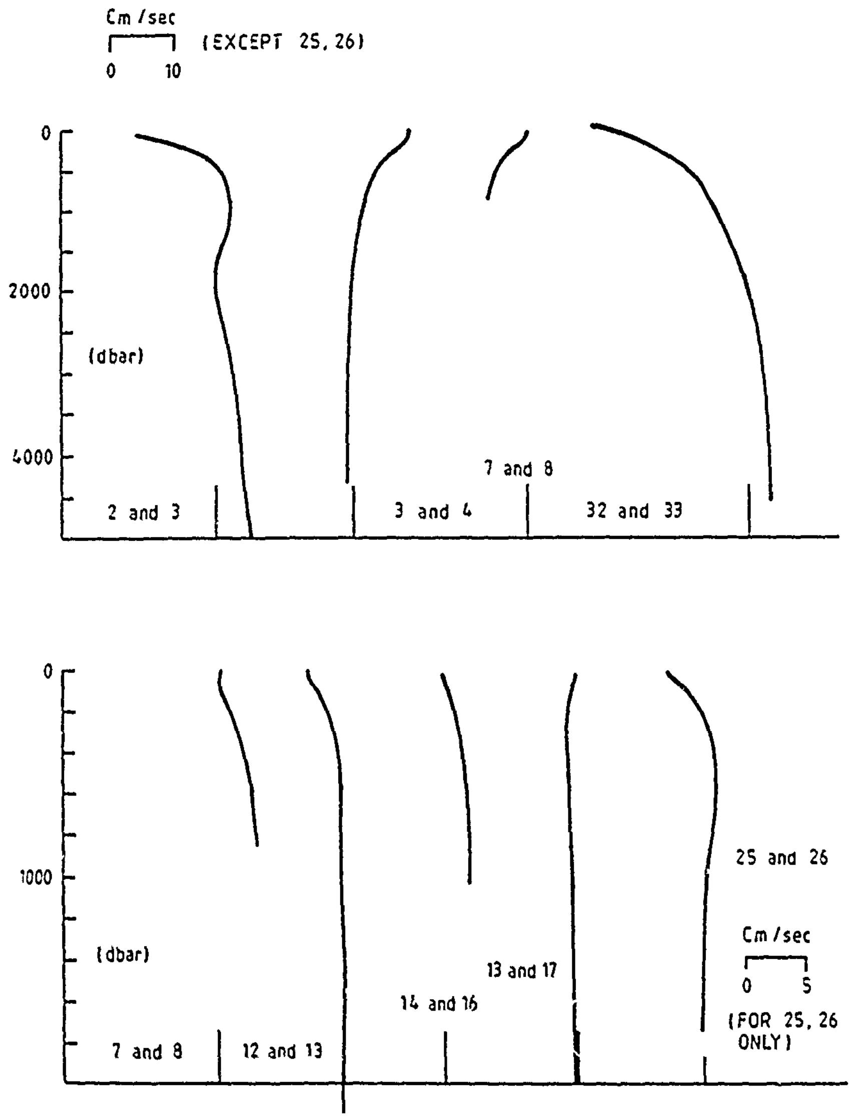


Figure 27. Geostrophic current profiles between selected station pairs for SEAMAP 3 (RANRL 1/86) route A summer. Subject to error because of a poor salinity calibration

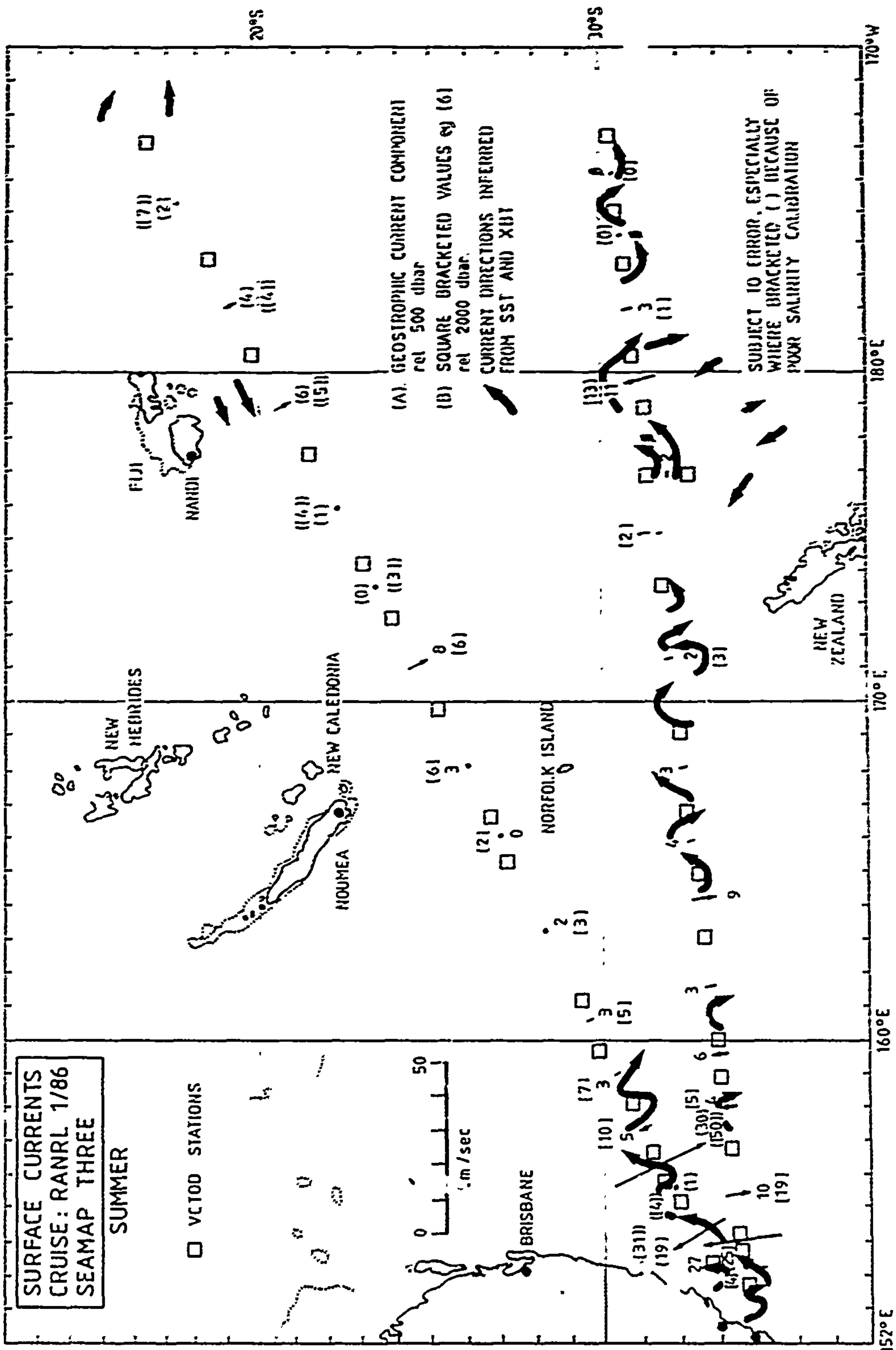


Figure 28. Surface current directions inferred from VCTOD, XBT, and sea surface temperature data. Summer survey SEAMAP 3 (RANRL 1/86) route A

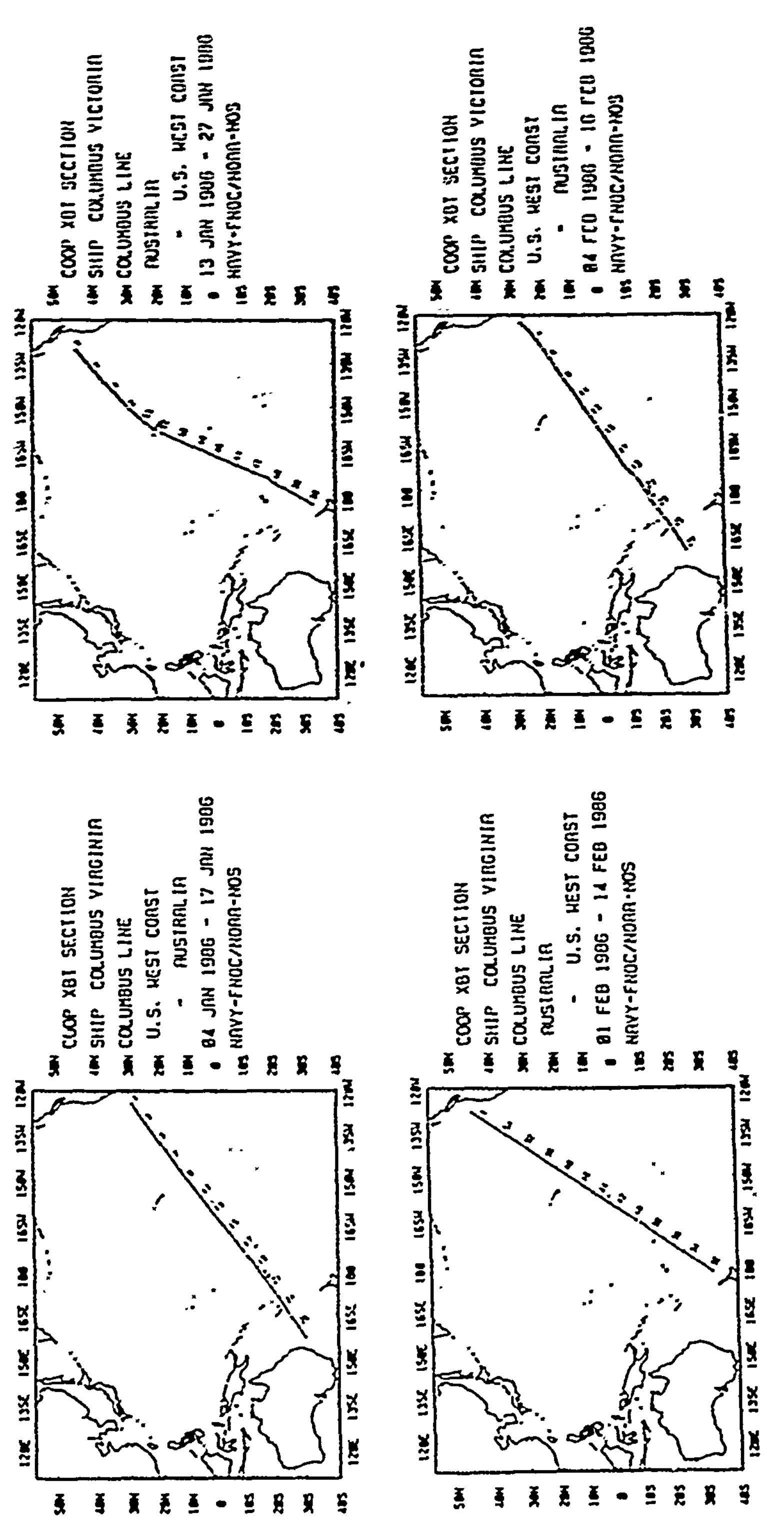


Figure 29(a). Tracks of vessels in the CSIRO merchant ship XBT programme in the south west Pacific Ocean for January to March 1986. Coinciding with the period of summer survey SEAMAP 3 (RANRL 1/86) route A

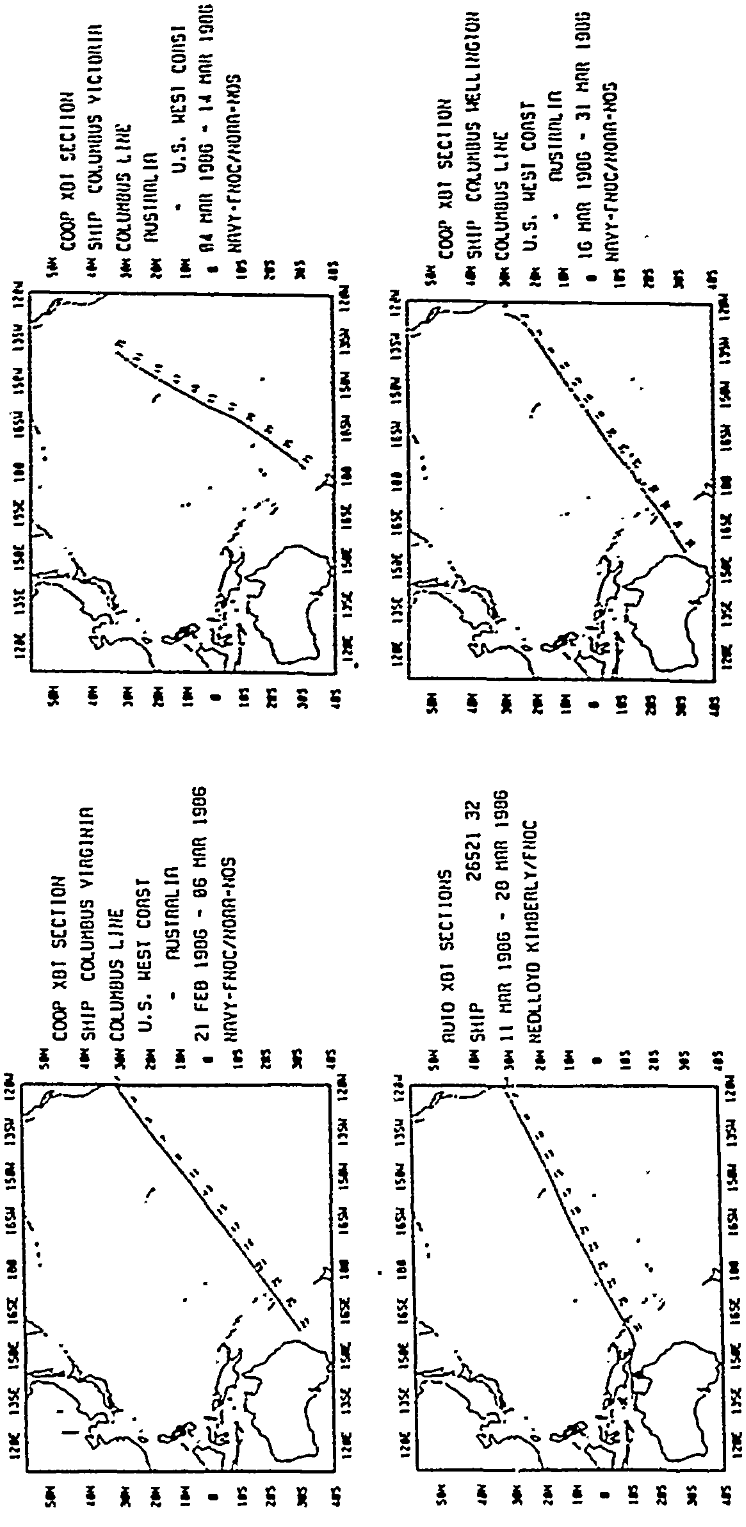


Figure 29(b). Tracks of vessels in the CSIRO merchant ship XBT programme in the south west Pacific Ocean for January to March 1986. Coinciding with the period of summer survey SEAMAP 3 (RANRL 1/86) route A

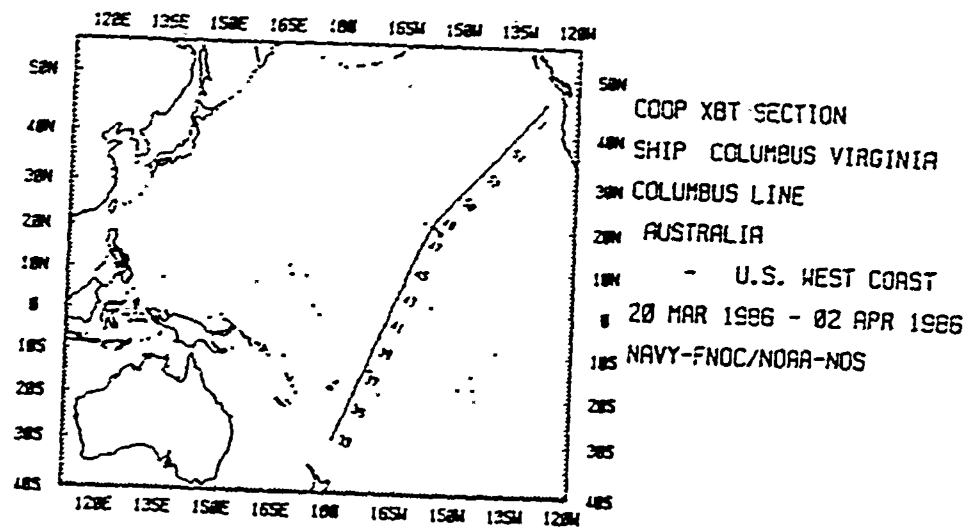


Figure 29(c). Tracks of vessels in the CSIRO merchant ship XBT programme in the south west Pacific Ocean for January to March 1986. Coinciding with the period of summer survey SEAMAP 3 (RANRL 1/86) route A

TABLES OF VCTOD DATA FOR 35 STATIONS OCCUPIED ON SUMMER SURVEY SEAMAP 3 (RANRL 1/86) ARE GIVEN ON FOLLOWING PAGES.

DATA ARE FOR DOWNCASTS. PROFILES ARE GIVEN TO 2000 m, AND ALSO TO 5000 m FOR DEEPER STATIONS. LARGE SPURIOUS SPIKES OCCUR IN SALINITY AND TEMPERATURE - SALINITY PROFILES, ESPECIALLY NEAR THE SURFACE.

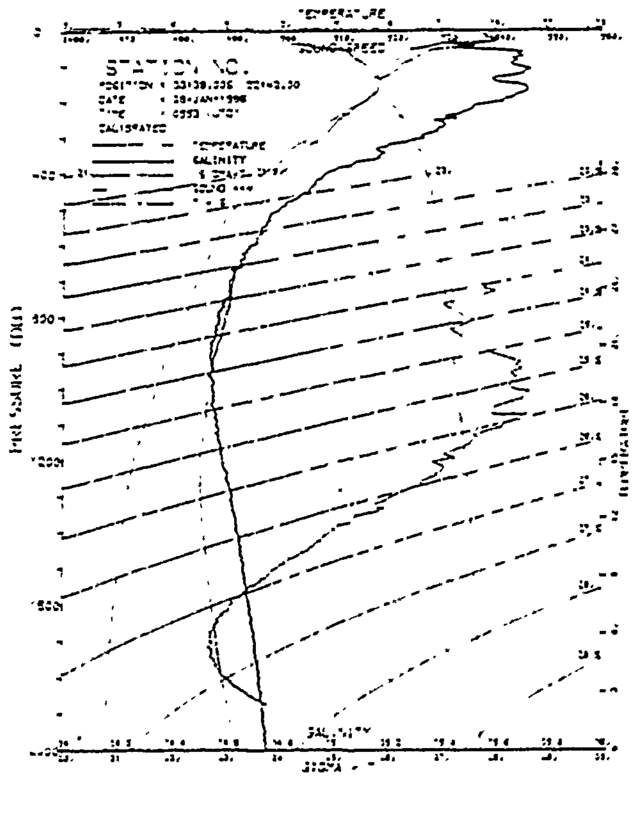
SEE FIGURE 6 (PAGE 15) FOR A CHART OF STATION POSITIONS.

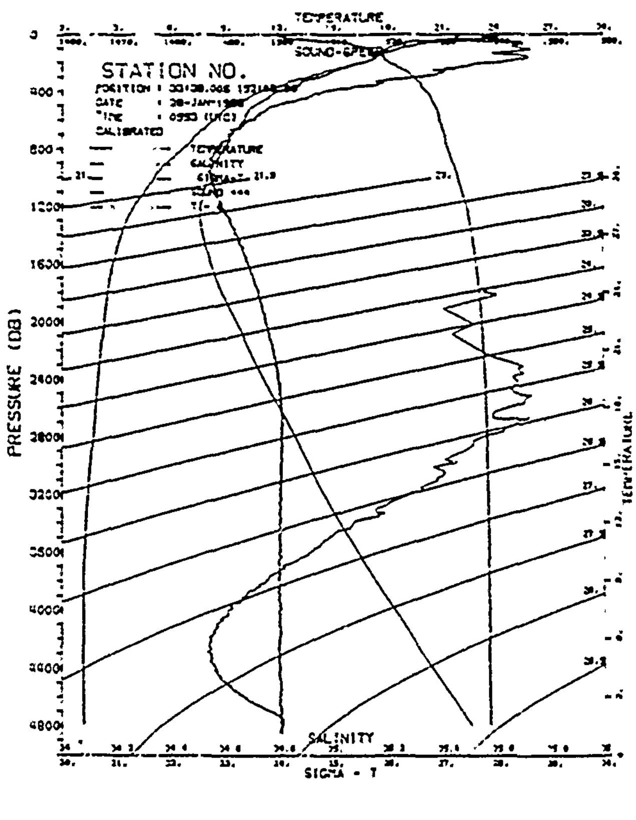
CALIBRATION DATA ARE GIVEN ON PAGES 76 TO 78.

Text continued on page 79

SHIP : HMAS COOK - Plessey
STATION NUMBER : 1 (THROUGH THE CRUISE)
STATION NUMBER : 1 (THROUGH THE YEAR)
DATE : 28-JAN-1986 (DAY NUMBER 28)
START TIME : 0553 GMT - Z
CRUISE : CK01,86
POSITION : 33:39.00S 152:42.00E
CAST DEPTH : 4704 METRES
BOTTOM DEPTH : 4842 METRES

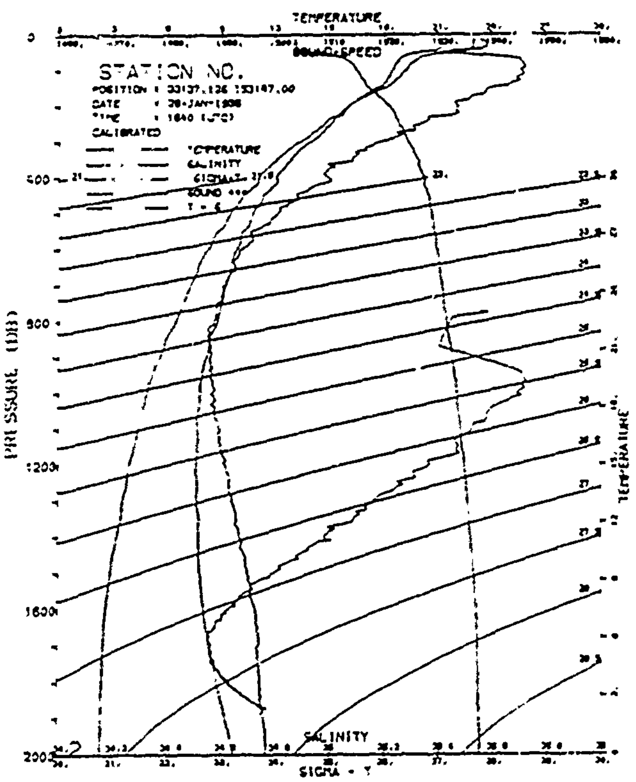
PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
0.0	0.0	24.207	35.483	23.947	395.09	0.000	1533.33	24.21	2	0.000	0.003
10.0	9.9	24.202	35.501	23.962	394.03	0.395	1533.35	24.20	16	0.008	0.008
20.0	19.9	23.953	35.518	24.049	386.12	0.785	1532.84	23.95	15	0.110	0.092
30.0	29.8	23.831	35.523	24.089	382.70	1.169	1532.69	23.82	17	0.058	0.127
40.0	39.7	22.574	35.410	24.368	356.42	1.539	1529.32	22.57	17	0.368	0.322
50.0	49.6	21.352	35.429	24.726	322.71	1.878	1526.23	21.34	13	0.620	0.509
60.0	59.6	20.190	35.617	25.183	279.49	2.179	1523.64	20.18	16	0.118	0.100
70.0	69.5	19.822	35.635	25.294	269.26	2.454	1522.82	19.81	13	0.084	0.077
80.0	79.4	19.467	35.616	25.373	262.08	2.719	1521.93	19.45	9	0.124	0.124
90.0	89.3	19.003	35.593	25.475	252.69	2.977	1520.77	18.99	12	0.160	0.156
100.0	99.3	18.707	35.616	25.568	244.18	3.225	1520.17	18.69	13	0.059	0.039
120.0	119.1	18.244	35.635	25.699	232.29	3.702	1519.19	18.22	20	0.078	0.081
140.0	139.0	17.430	35.526	25.815	221.76	4.159	1517.01	17.41	19	0.052	0.038
160.0	158.8	17.460	35.660	25.911	213.36	4.592	1517.67	17.43	17	0.027	0.029
180.0	178.6	17.235	35.612	25.928	212.30	5.019	1517.23	17.21	19	0.083	0.106
200.0	198.5	16.676	35.534	26.002	205.79	5.437	1515.74	16.64	21	0.109	0.136
220.0	218.3	15.884	35.430	26.106	196.30	5.840	1513.57	15.85	16	0.077	0.074
240.0	238.2	15.280	35.349	26.180	189.71	6.226	1511.86	15.24	20	0.148	0.107
260.0	258.0	14.671	35.340	26.307	178.06	6.595	1510.36	14.63	20	0.040	0.031
280.0	277.8	14.225	35.310	26.380	171.51	6.944	1509.25	14.18	20	0.041	0.050
300.0	297.7	13.709	35.254	26.445	165.64	7.282	1507.78	13.67	22	0.050	0.062
320.0	317.5	13.018	35.128	26.489	161.63	7.610	1505.66	12.97	22	0.095	0.093
340.0	337.3	12.498	35.106	26.576	153.69	7.927	1504.31	12.45	22	0.010	0.016
360.0	357.1	12.268	35.059	26.584	153.27	8.233	1503.77	12.22	21	0.062	0.094
380.0	377.0	11.657	34.964	26.627	149.29	8.537	1501.88	11.61	19	0.075	0.093
400.0	396.8	11.089	34.896	26.679	144.41	8.831	1500.15	11.04	20	0.057	0.056
420.0	416.6	10.661	34.854	26.723	140.40	9.115	1498.98	10.61	23	0.063	0.056
440.0	436.4	10.404	34.833	26.752	137.91	9.393	1498.42	10.35	25	0.035	0.033
460.0	456.2	10.108	34.799	26.777	135.71	9.667	1497.64	10.05	29	0.048	0.052
480.0	476.0	9.783	34.745	26.790	134.57	9.938	1496.70	9.73	26	0.081	0.089
500.0	495.8	9.409	34.712	26.826	131.22	10.203	1495.67	9.35	21	0.035	0.036
550.0	545.4	8.825	34.651	26.873	127.12	10.846	1494.31	8.76	23	0.033	0.039
600.0	594.9	8.475	34.609	26.895	125.60	11.474	1493.75	8.41	20	0.040	0.047
700.0	693.9	7.432	34.527	26.985	117.39	12.685	1491.35	7.36	20	0.039	0.035
800.0	792.8	6.651	34.488	27.063	110.35	13.826	1489.96	6.58	21	0.030	0.020
900.0	891.7	5.800	34.461	27.152	101.75	14.892	1488.18	5.72	25	0.031	0.031
1000.0	990.5	5.099	34.461	27.236	93.58	15.865	1487.01	5.02	18	0.013	0.012
1100.0	1089.3	4.509	34.475	27.315	85.87	16.764	1486.26	4.42	22	0.019	0.014
1200.0	1188.0	3.943	34.498	27.393	78.03	17.582	1485.57	3.85	24	0.012	0.009
1300.0	1286.7	3.548	34.529	27.457	71.68	18.328	1485.60	3.45	13	0.006	0.004
1400.0	1385.4	3.244	34.552	27.505	67.01	19.023	1486.02	3.14	24	0.008	0.005
1500.0	1484.0	3.036	34.573	27.541	63.59	19.677	1486.79	2.93	18	0.005	0.006
1600.0	1582.6	2.812	34.592	27.577	60.10	20.296	1487.52	2.70	18	0.008	0.005
1700.0	1681.1	2.642	34.614	27.609	57.04	20.882	1488.51	2.52	20	0.006	0.004
1800.0	1779.5	2.514	34.633	27.636	54.58	21.441	1489.65	2.39	21	0.003	0.000
1900.0	1878.0	2.417	34.648	27.655	52.85	21.980	1490.94	2.28	17	0.005	0.003
2000.0	1976.3	2.330	34.657	27.670	51.58	22.502	1492.22	2.19	19	0.000	0.000
2100.0	2074.7	2.240	34.668	27.686	50.14	23.008	1493.52	2.09	20	0.002	0.000
2200.0	2173.0	2.138	34.685	27.708	48.05	23.497	1494.80	1.98	24	0.000	0.004
2300.0	2271.2	2.058	34.694	27.722	46.81	23.969	1496.14	1.89	18	0.003	0.002
2400.0	2369.4	1.980	34.702	27.734	45.62	24.429	1497.52	1.81	30	0.005	0.000
2500.0	2467.5	1.907	34.710	27.746	44.50	24.879	1498.90	1.73	29	0.004	0.002
2600.0	2565.6	1.841	34.713	27.754	43.76	25.320	1500.29	1.65	19	0.004	0.003
2700.0	2663.7	1.775	34.717	27.762	42.96	25.754	1501.73	1.58	26	0.002	0.002
2800.0	2761.7	1.703	34.710	27.763	42.80	26.182	1503.09	1.50	23	0.001	0.000
2900.0	2859.7	1.618	34.717	27.774	41.46	26.602	1504.45	1.41	24	0.005	0.000
3000.0	2957.6	1.533	34.712	27.776	40.99	27.015	1505.78	1.32	35	0.004	0.002
3100.0	3055.5	1.459	34.712	27.782	40.25	27.420	1507.19	1.23	26	0.003	0.003
3200.0	3153.4	1.386	34.709	27.785	39.66	27.819	1508.56	1.15	35	0.005	0.004
3300.0	3251.1	1.321	34.713	27.793	38.73	28.211	1510.00	1.08	29	0.003	0.003
3400.0	3348.9	1.275	34.709	27.792	38.59	28.599	1511.49	1.02	24	0.004	0.002
3500.0	3446.6	1.234	34.707	27.794	38.35	28.984	1513.09	0.97	37	0.003	0.001
3600.0	3544.3	1.203	34.707	27.796	38.07	29.365	1514.67	0.93	32	0.001	0.001
3700.0	3641.9	1.187	34.705	27.796	38.20	29.747	1516.31	0.91	41	0.001	0.001
3800.0	3739.5	1.168	34.706	27.798	38.07	30.127	1517.95	0.88	30	0.003	0.002
3900.0	3837.0	1.161	34.707	27.799	38.07	30.508	1519.66	0.86	38	0.002	0.002
4000.0	3934.5	1.155	34.709	27.801	38.03	30.890	1521.37	0.85	30	0.003	0.001
4100.0	4031.9	1.152	34.707	27.800	38.32	31.273	1523.10	0.83	19	0.001	0.000
4200.0	4129.4	1.150	34.704	27.798	38.70	31.656	1524.84	0.82	21	0.003	0.000
4300.0	4226.7	1.151	34.708	27.800	38.68	32.044	1526.61	0.81	19	0.003	0.003
4400.0	4324.0	1.149	34.710	27.802	38.66	32.432	1528.33	0.80	16	0.003	0.001
4500.0	4421.3	1.152	34.713	27.804	38.71	32.822	1530.09	0.79	15	0.000	0.002
4600.0	4518.6	1.160	34.706	27.798	39.51	33.212	1531.89	0.78	18	0.003	0.003
4700.0	4615.7	1.162	34.709	27.801	39.51	33.606	1533.67	0.77	23	0.000	0.002
4800.0	4712.9	1.172	34.709	27.800	39.90	34.003	1535.37	0.77	9	0.003	0.002

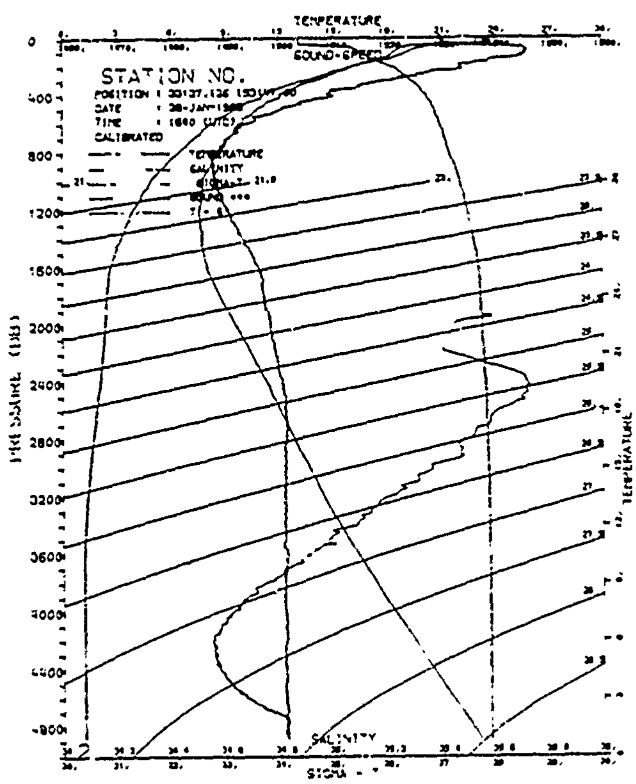




SHIP : HMAS COOK - Plessey
STATION NUMBER : 2 (THROUGH THE CRUISE)
STATION NUMBER : 2 (THROUGH THE YEAR)
DATE : 28-JAN-1986 (DAY NUMBER 28)
START-TIME : 1640 GMT = Z
CRUISE : CK01/86
POSITION : 33:37.125 153:47.00E
CAST DEPTH : 4784 METRES
BOTTOM DEPTH : 4882 METRES

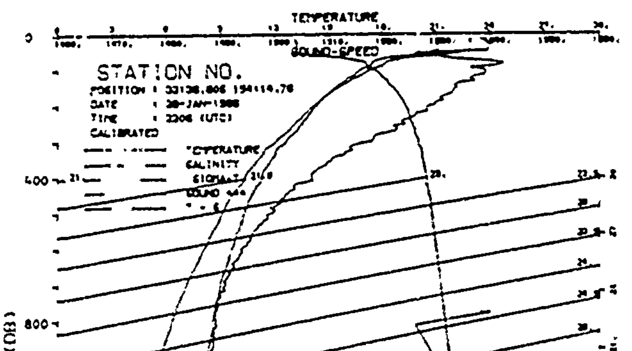
PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.3	22.973	0.000	0.000	0.00	-0.000	1530.28	22.97	10	0.000	0.003
20.0	19.9	22.975	0.000	0.000	0.00	-0.000	1530.40	22.97	15	0.005	0.015
30.0	29.8	22.973	0.000	0.000	0.00	0.000	1530.56	22.97	16	0.000	0.003
40.0	39.7	22.918	0.000	0.000	0.00	0.000	1530.51	22.91	16	0.058	0.082
50.0	49.6	22.107	0.000	0.000	0.00	0.000	1527.89	22.10	19	0.750	0.862
60.0	59.6	20.445	0.000	0.000	0.08	0.000	1524.15	20.43	16	0.267	0.272
70.0	69.5	19.891	0.000	0.000	0.00	0.000	1523.01	19.88	18	0.085	0.074
80.0	79.4	19.615	0.000	0.000	0.00	0.000	1522.38	19.60	15	0.084	0.090
90.0	89.3	19.392	0.000	0.000	0.00	0.000	1521.99	19.38	20	0.040	0.040
100.0	99.3	19.243	0.000	0.000	0.00	0.000	1521.68	19.23	17	0.064	0.075
120.0	119.1	18.880	0.000	0.000	0.00	0.000	1520.99	18.86	16	0.070	0.097
140.0	139.0	18.441	0.000	0.000	0.00	0.000	1520.02	18.42	17	0.070	0.075
160.0	158.8	17.595	0.000	0.000	0.00	0.000	1517.72	17.57	16	0.121	0.126
180.0	178.6	16.795	0.000	0.000	0.00	0.000	1515.61	16.77	19	0.098	0.075
200.0	198.5	16.101	0.000	0.000	0.00	0.000	1513.82	16.07	12	0.074	0.071
220.0	218.3	15.652	0.000	0.000	0.00	0.000	1512.80	15.62	15	0.032	0.027
240.0	238.2	14.979	0.000	0.000	0.00	0.000	1510.91	14.94	17	0.049	0.053
260.0	258.0	14.496	0.000	0.000	0.00	0.000	1509.64	14.46	17	0.136	0.133
280.0	277.8	14.017	0.000	0.000	0.00	0.000	1508.34	13.98	12	0.058	0.044
300.0	297.7	13.455	0.000	0.000	0.00	0.000	1506.77	13.41	17	0.112	0.128
320.0	317.5	12.797	0.000	0.000	0.00	0.000	1504.88	12.75	18	0.099	0.099
340.0	337.3	12.346	0.000	0.000	0.00	0.000	1503.64	12.30	16	0.065	0.077
360.0	357.1	11.881	0.000	0.000	0.00	0.000	1502.36	11.83	15	0.098	0.099
380.0	377.0	11.459	0.000	0.000	0.00	0.000	1501.16	11.41	12	0.058	0.060
400.0	396.8	11.103	0.000	0.000	0.00	0.000	1500.31	11.05	16	0.022	0.018
420.0	416.6	11.001	0.000	0.000	0.00	0.000	1500.16	10.95	16	0.069	0.084
440.0	436.4	10.505	0.000	0.000	0.00	0.000	1498.72	10.45	20	0.060	0.064
460.0	456.2	10.119	0.000	0.000	0.00	0.000	1497.68	10.06	18	0.014	0.017
480.0	476.0	9.827	0.000	0.000	0.00	0.000	1496.87	9.77	20	0.067	0.074
500.0	495.8	9.504	0.000	0.000	0.00	0.000	1496.05	9.45	20	0.028	0.030
550.0	545.4	8.794	0.000	0.000	0.00	0.000	1494.09	8.73	19	0.068	0.074
600.0	594.9	8.245	0.000	0.000	0.00	0.000	1492.86	8.18	17	0.050	0.040
700.0	693.9	7.270	0.000	0.000	0.00	0.000	1490.72	7.20	19	0.033	0.036
800.0	792.8	6.448	0.000	0.000	0.00	0.000	1489.15	6.37	22	0.026	0.018
900.0	891.7	5.573	0.000	0.000	0.00	0.000	1487.26	5.49	19	0.025	0.023
1000.0	990.5	4.885	0.000	0.000	0.00	0.000	1486.08	4.80	19	0.024	0.022
1100.0	1089.3	4.365	0.000	0.000	0.00	0.000	1485.67	4.28	19	0.008	0.004
1200.0	1188.0	3.891	0.000	0.000	0.00	0.000	1485.36	3.80	19	0.016	0.008
1300.0	1286.7	3.531	0.000	0.000	0.00	0.000	1485.54	3.43	15	0.012	0.009
1400.0	1385.4	3.221	0.000	0.000	0.00	0.000	1485.88	3.12	18	0.013	0.010
1500.0	1484.0	2.882	0.000	0.000	0.00	0.000	1486.16	2.78	14	0.006	0.007
1600.0	1582.6	2.637	0.000	0.000	0.00	0.000	1486.80	2.53	20	0.008	0.005
1700.0	1681.1	2.503	0.000	0.000	0.00	0.000	1487.90	2.38	19	0.002	0.004
1800.0	1779.5	2.438	0.000	0.000	0.00	0.000	1489.29	2.31	23	0.005	0.004
1900.0	1878.0	2.381	0.000	0.000	0.00	0.000	1490.77	2.25	13	0.000	0.002
2000.0	1976.3	2.332	0.000	0.000	0.00	0.000	1492.23	2.19	20	0.003	0.004
2100.0	2074.7	2.274	0.000	0.000	0.00	0.000	1493.61	2.13	18	0.004	0.001
2200.0	2173.0	2.209	0.000	0.000	0.00	0.000	1495.06	2.05	15	0.000	0.000
2300.0	2271.2	2.146	0.000	0.000	0.00	0.000	1496.43	1.98	18	0.004	0.004
2400.0	2369.4	2.068	0.000	0.000	0.00	0.000	1497.82	1.90	18	0.002	0.003
2500.0	2467.5	1.946	0.000	0.000	0.00	0.000	1499.04	1.77	21	0.000	0.002
2600.0	2565.7	1.886	0.000	0.000	0.00	0.000	1500.46	1.70	22	0.001	0.003
2700.0	2663.7	1.797	0.000	0.000	0.00	0.000	1501.76	1.60	19	0.007	0.002
2800.0	2761.7	1.703	0.000	0.000	0.00	0.000	1503.05	1.50	16	0.002	0.003
2900.0	2859.7	1.594	0.000	0.000	0.00	0.000	1504.29	1.38	17	0.003	0.003
3000.0	2957.6	1.521	0.000	0.000	0.00	0.000	1505.70	1.30	18	0.000	0.000
3100.0	3055.5	1.434	0.000	0.000	0.00	0.000	1507.00	1.21	21	0.005	0.002
3200.0	3153.4	1.355	0.000	0.000	0.00	0.000	1508.37	1.12	19	0.004	0.004
3300.0	3251.2	1.289	0.000	0.000	0.00	0.000	1509.80	1.05	20	0.004	0.003
3400.0	3348.9	1.254	0.000	0.000	0.00	0.000	1511.40	1.00	21	0.004	0.003
3500.0	3446.6	1.219	0.000	0.000	0.00	0.000	1512.97	0.96	20	0.002	0.000
3600.0	3544.3	1.192	0.000	0.000	0.00	0.000	1514.58	0.92	17	0.003	0.004
3700.0	3641.9	1.177	0.000	0.000	0.00	0.000	1516.23	0.90	20	0.003	0.002
3800.0	3739.5	1.162	0.000	0.000	0.00	0.000	1517.90	0.87	20	0.001	0.004
3900.0	3837.0	1.162	0.000	0.000	0.00	0.000	1519.62	0.86	20	0.002	0.000
4000.0	3934.5	1.160	0.000	0.000	0.00	0.000	1521.35	0.85	13	0.003	0.004
4100.0	4032.0	1.163	0.000	0.000	0.00	0.000	1523.13	0.84	14	0.001	0.002
4200.0	4129.4	1.170	0.000	0.000	0.00	0.000	1524.86	0.84	19	0.003	0.001
4300.0	4226.7	1.172	0.000	0.000	0.00	0.000	1526.62	0.83	14	0.002	0.004
4400.0	4324.1	1.172	0.000	0.000	0.00	0.000	1528.40	0.82	19	0.002	0.000
4500.0	4421.3	1.182	0.000	0.000	0.00	0.000	1530.16	0.82	13	0.002	0.000
4600.0	4518.6	1.184	0.000	0.000	0.00	0.000	1531.96	0.81	19	0.002	0.000
4700.0	4615.8	1.190	0.000	0.000	0.00	0.000	1533.74	0.80	16	0.003	0.002
4800.0	4712.9	1.192	0.000	0.000	0.00	0.000	1535.50	0.79	19	0.002	0.001
4890.0	4800.3	1.193	0.000	0.000	0.00	0.000	1536.96	0.78	37	0.003	0.004

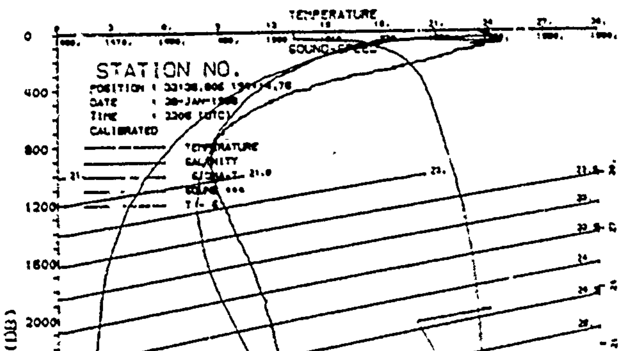




SHIP : HMAS COOK - Plessey
STATION NUMBER : 3 (THROUGH THE CRUISE)
STATION NUMBER : 3 (THROUGH THE YEAR)
DATE : 29-JAN-1986 (DAY NUMBER 29)
START TIME : 2206 GMT - 2
CRUISE : CR01/86
POSITION : 33:36 60S 154:14.76E
CAST DEPTH : 4734 METRES
BOTTOM DEPTH : 4830 METRES

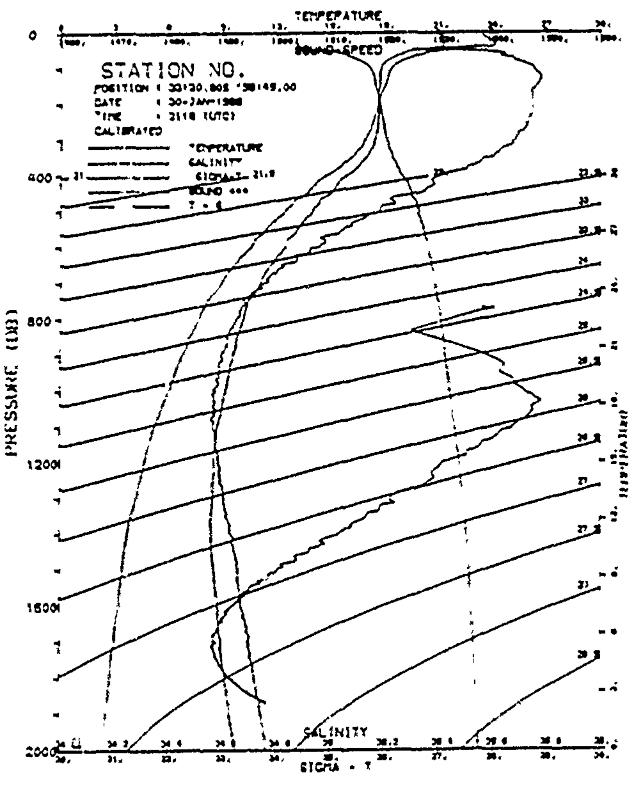
PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	22.905	35.489	24.334	358.63	0.358	1530.08	22.90	17	0.004	0.004
20.0	19.9	22.902	35.505	24.346	357.77	0.717	1530.20	22.90	15	0.000	0.015
30.0	29.8	22.903	35.519	24.357	357.12	1.074	1530.38	22.90	19	0.002	0.003
40.0	39.7	22.905	35.525	24.361	357.14	1.431	1530.54	22.90	18	0.004	0.005
50.0	49.6	22.783	35.436	24.328	360.64	1.790	1530.26	22.77	18	0.163	0.334
60.0	59.6	21.104	35.283	24.682	327.18	2.134	1525.56	21.09	20	0.640	0.705
70.0	69.5	19.167	35.383	25.272	271.26	2.433	1520.57	19.15	18	0.375	0.359
80.0	79.4	18.239	35.533	25.622	238.24	2.688	1518.36	18.22	19	0.074	0.023
90.0	89.3	18.017	35.523	25.670	234.05	2.924	1517.91	18.00	19	0.113	0.181
100.0	99.3	17.415	35.479	25.783	223.53	3.153	1516.25	17.40	18	0.151	0.133
120.0	119.1	16.674	35.451	25.939	209.26	3.583	1514.36	16.65	17	0.144	0.158
140.0	139.0	15.932	35.392	26.066	197.72	3.986	1512.34	15.91	18	0.122	0.136
160.0	158.8	15.281	35.375	26.200	185.46	4.369	1510.68	15.26	23	0.074	0.076
180.0	178.6	14.695	35.342	26.303	176.10	4.731	1509.12	14.67	20	0.098	0.093
200.0	198.5	14.219	35.297	26.371	170.08	5.078	1507.68	14.19	21	0.084	0.103
220.0	218.3	13.809	35.254	26.421	165.50	5.413	1506.84	13.78	21	0.072	0.091
240.0	238.2	13.398	35.183	26.454	163.01	5.740	1505.74	13.36	17	0.076	0.089
260.0	258.0	12.964	35.151	26.518	157.32	6.059	1504.58	12.93	20	0.062	0.038
280.0	277.8	12.579	35.110	26.562	153.46	6.369	1503.57	12.54	17	0.068	0.097
300.0	297.7	12.106	35.063	26.618	148.47	6.671	1502.27	12.07	19	0.034	0.031
320.0	317.5	11.548	34.985	26.664	144.33	6.966	1500.61	11.51	20	0.068	0.057
340.0	337.3	11.308	34.949	26.680	143.14	7.254	1500.06	11.27	18	0.032	0.058
360.0	357.1	10.954	34.901	26.707	140.75	7.538	1499.11	10.91	21	0.050	0.049
380.0	377.0	10.621	34.860	26.735	138.33	7.817	1498.20	10.57	18	0.061	0.069
400.0	396.8	10.383	34.837	26.759	136.39	8.092	1497.68	10.34	18	0.026	0.022
420.0	416.6	10.154	34.786	26.759	136.64	8.364	1497.08	10.10	21	0.075	0.084
440.0	436.4	9.818	34.757	26.794	133.45	8.634	1496.21	9.77	20	0.042	0.037
460.0	456.2	9.528	34.726	26.818	131.35	8.899	1495.49	9.48	20	0.045	0.051
480.0	476.0	9.318	34.705	26.836	129.81	9.160	1495.01	9.26	23	0.033	0.045
500.0	495.8	9.119	34.684	26.852	128.51	9.418	1494.56	9.06	21	0.030	0.039
550.0	545.4	8.574	34.620	26.888	125.49	10.053	1493.33	8.52	20	0.037	0.043
600.0	594.9	8.055	34.571	26.929	121.87	10.670	1492.11	7.99	19	0.048	0.030
700.0	693.9	7.090	34.509	27.020	113.66	11.847	1490.02	7.02	20	0.025	0.024
800.0	792.8	6.299	34.472	27.097	106.57	12.951	1488.55	6.23	19	0.015	0.014
900.0	891.7	5.625	34.459	27.172	99.52	13.988	1487.50	5.55	21	0.014	0.013
1000.0	990.5	5.008	34.463	27.249	92.21	14.948	1486.65	4.92	19	0.015	0.014
1100.0	1089.3	4.544	34.472	27.308	86.61	15.836	1486.38	4.46	18	0.008	0.004
1200.0	1188.0	3.993	34.500	27.389	78.51	16.664	1485.77	3.90	16	0.007	0.006
1300.0	1286.7	3.672	34.522	27.439	73.72	17.424	1486.09	3.57	18	0.006	0.005
1400.0	1385.4	3.392	34.540	27.481	69.68	18.140	1486.56	3.29	20	0.012	0.011
1500.0	1484.0	3.057	34.569	27.536	64.14	18.811	1486.86	2.95	22	0.011	0.008
1600.0	1582.6	2.850	34.588	27.570	60.88	19.434	1487.67	2.74	19	0.011	0.008
1700.0	1681.1	2.639	34.612	27.607	57.17	20.023	1488.46	2.52	21	0.005	0.001
1800.0	1779.5	2.507	34.626	27.631	55.01	20.583	1489.59	2.38	17	0.005	0.003
1900.0	1878.0	2.401	34.645	27.655	52.83	21.119	1490.82	2.27	17	0.002	0.002
2000.0	1976.3	2.328	34.659	27.672	51.38	21.641	1492.18	2.19	22	0.004	0.002
2100.0	2074.7	2.239	34.675	27.692	49.59	22.145	1493.51	2.09	24	0.000	0.003
2200.0	2173.0	2.158	34.685	27.707	48.28	22.635	1494.80	2.00	21	0.000	0.004
2300.0	2271.2	2.067	34.698	27.724	46.61	23.110	1496.15	1.96	20	0.004	0.004
2400.0	2369.4	1.987	34.708	27.738	45.30	23.570	1497.49	1.82	16	0.002	0.002
2500.0	2467.6	1.923	34.710	27.745	44.68	24.021	1498.89	1.74	18	0.004	0.005
2600.0	2565.7	1.817	34.715	27.758	43.29	24.461	1500.15	1.63	23	0.004	0.003
2700.0	2663.7	1.728	34.718	27.767	42.21	24.888	1501.46	1.53	21	0.005	0.000
2800.0	2761.7	1.649	34.719	27.773	41.46	25.309	1502.84	1.45	21	0.005	0.000
2900.0	2859.7	1.578	34.716	27.777	40.98	25.721	1504.22	1.37	21	0.005	0.004
3000.0	2957.6	1.509	34.715	27.781	40.43	26.126	1505.64	1.29	19	0.004	0.003
3100.0	3055.5	1.421	34.715	27.787	39.44	26.523	1506.97	1.20	19	0.003	0.003
3200.0	3153.4	1.351	34.713	27.791	38.87	26.913	1508.37	1.12	16	0.004	0.002
3300.0	3251.2	1.300	34.714	27.795	38.36	27.298	1509.83	1.06	19	0.003	0.001
3400.0	3348.9	1.252	34.712	27.797	38.01	27.679	1511.37	1.00	19	0.004	0.003
3500.0	3446.6	1.217	34.711	27.799	37.77	28.056	1512.94	0.96	18	0.002	0.001
3600.0	3544.3	1.198	34.707	27.797	38.02	28.434	1514.56	0.93	18	0.000	0.003
3700.0	3641.9	1.186	34.705	27.796	38.20	28.814	1516.27	0.91	22	0.003	0.003
3800.0	3739.5	1.176	34.710	27.800	37.92	29.195	1517.96	0.89	19	0.002	0.003
3900.0	3837.0	1.162	34.707	27.799	38.10	29.575	1519.61	0.86	19	0.002	0.000
4000.0	3934.5	1.157	34.707	27.800	38.20	29.957	1521.34	0.85	18	0.003	0.000
4100.0	4032.0	1.155	34.710	27.802	38.17	30.340	1523.07	0.84	17	0.003	0.004
4200.0	4129.4	1.158	34.708	27.800	38.53	30.723	1524.83	0.83	19	0.004	0.000
4300.0	4226.7	1.160	34.711	27.802	38.61	31.110	1526.59	0.82	21	0.003	0.003
4400.0	4324.1	1.162	34.715	27.805	38.54	31.497	1528.37	0.81	24	0.002	0.003
4500.0	4421.3	1.164	34.714	27.804	38.84	31.886	1530.12	0.80	20	0.002	0.000
4600.0	4518.6	1.167	34.712	27.803	39.21	32.278	1531.88	0.79	18	0.003	0.004
4700.0	4615.8	1.171	34.711	27.801	39.56	32.672	1533.66	0.78	17	0.002	0.000
4800.0	4712.9	1.173	34.715	27.805	39.46	33.067	1535.42	0.77	24	0.002	0.003
4820.0	4732.3	1.174	34.714	27.803	39.63	33.146	1535.70	0.77	119	0.003	0.003

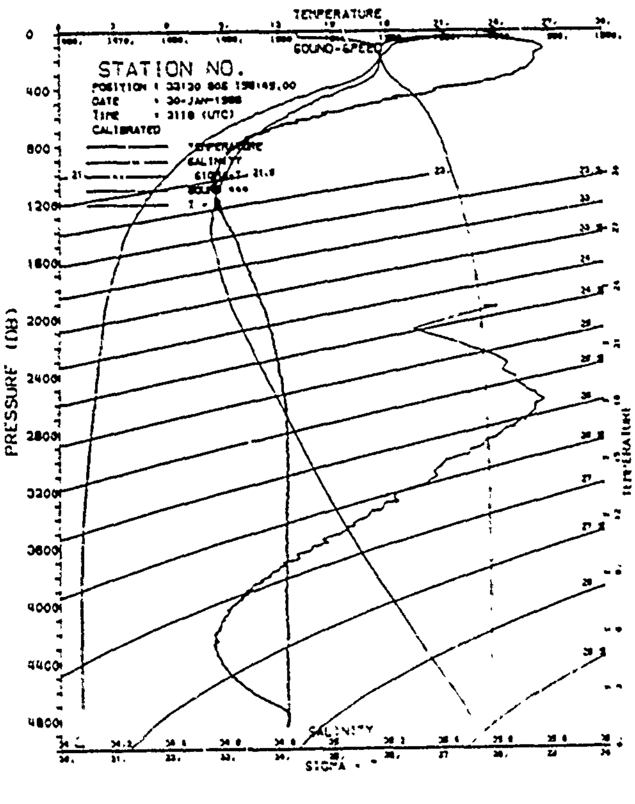




SHIP : HMAS COOK - Plessey
STATION NUMBER : 4 (THROUGH THE CRUISE)
STATION NUMBER : 4 (THROUGH THE YEAR)
DATE : 30-JAN-1986 (DAY NUMBER 30)
START TIME : 2118 GMT - Z
CRUISE : CK01/86
POSITION : 33:20.80S 156:45.00E
CAST DEPTH : 4692 METRES
BOTTOM DEPTH : 4705 METRES

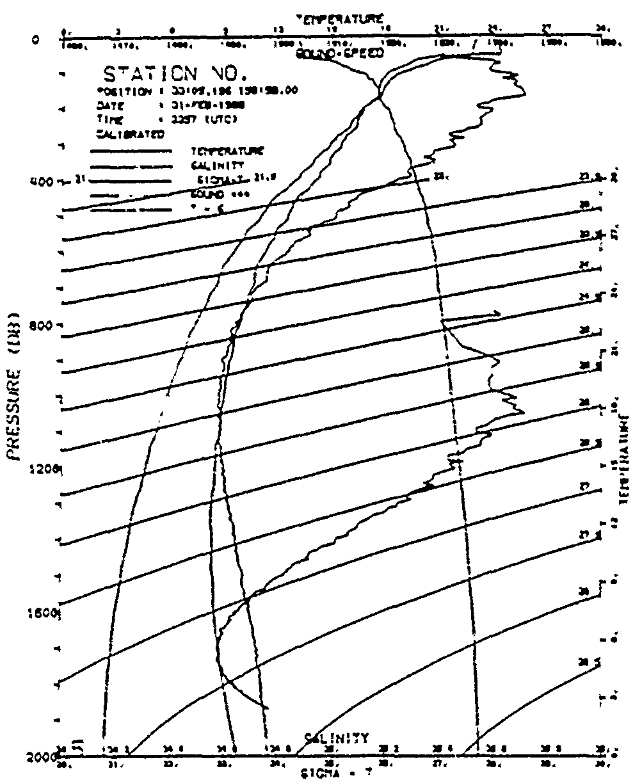
PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	23.052	35 488	24.290	362.76	0.363	1530.48	23.05	25	0.003	0.007
20.0	19.9	23.053	35.508	24.305	361.70	0.725	1530.63	23.05	22	0.003	0.018
30.0	29.8	23.054	35.526	24.319	360.80	1.086	1530.76	23.05	17	0.000	0.002
40.0	39.7	23.025	35.519	24.322	360.86	1.447	1530.84	23.02	19	0.036	0.074
50.0	49.6	21.240	35.372	24.713	323.93	1.789	1525.56	21.23	15	0.782	0.681
60.0	59.6	20.101	35.537	25.146	282.98	2.093	1523.22	20.09	21	0.176	0.192
70.0	69.5	19.483	35.586	25.346	264.28	2.366	1521.79	19.47	19	0.148	0.134
80.0	79.4	19.002	35.610	25.488	251.06	2.624	1520.61	18.99	21	0.130	0 105
90.0	89.3	18.624	35.644	25.610	239.78	2.869	1519.79	18.61	21	0.103	0.079
100.0	99.3	18.433	35.668	25.677	233.75	3.106	1519.48	18.42	17	0.032	0.038
120.0	119.1	18.239	35.690	25.743	228.17	3.568	1519.29	18.22	20	0.017	0.011
140.0	139.0	18.129	35 689	25.769	226.31	4.022	1519.29	18.10	18	0.019	0.020
160.0	158.8	17.956	35.664	25.792	224.72	4.473	1519.09	17.93	16	0.030	0.034
180 0	178.6	17.793	35.662	25.831	221.64	4.919	1518.95	17.76	21	0.022	0.021
200.0	198.5	17.679	35.662	25.859	219.61	5.360	1518.96	17.64	18	0.010	0.007
220.0	218.3	17.594	35.660	25.879	218.42	5.798	1519.03	17.56	16	0.012	0.013
240.0	238.2	17.465	35.647	25.900	217.02	6.233	1518.92	17.42	15	0.026	0.032
260.0	258.0	17.323	35 640	25.929	214.83	6.664	1518.85	17.28	18	0.022	0.020
280.0	277.8	17.159	35.613	25.948	213.62	7.093	1518.65	17.11	19	0.039	0.049
300.0	297.7	16.924	35.591	25.987	210.47	7.517	1518.25	16.87	21	0.040	0.041
320.0	317.5	16.732	35.563	26.011	208.74	7.935	1517.95	16.68	21	0.051	0.067
340.0	337.3	16.348	35.523	26.071	203.55	8.347	1517.07	16.29	27	0.050	0.056
360.0	357.1	15.896	35.473	26.136	197.71	8.749	1515.96	15.84	26	0.086	0.088
380.0	377.0	15.462	35.416	26.191	192.88	9.140	1514.87	15.40	25	0.114	0.129
400.0	396.8	14.820	35.309	26.250	187.46	9.520	1513.00	14.76	22	0.113	0.110
420.0	416.6	14.268	35.208	26.354	177.90	9.885	1511.59	14.21	19	0.068	0.041
440.0	436.4	13.919	35.264	26.409	172.96	10.236	1510.77	13.86	15	0.053	0.054
460.0	456.2	13.388	35.157	26.436	170.57	10.580	1509.16	13.32	20	0.127	0.144
480.0	476.0	12.885	35.143	26.527	162.06	10.912	1507.92	12.82	19	0.025	0.035
500.0	495.9	12.464	35.085	26.566	158.58	11.233	1506.77	12.40	17	0.032	0.031
550.0	545.4	11.451	34.949	26.6"	150.55	12.007	1503.96	11.38	20	0.066	0.060
600.0	594.9	10.610	34.855	26.73?	143.31	12.738	1501.76	10.54	18	0.038	0.043
700.0	693.9	8.931	34.658	26.861	131.18	14.109	1497.11	8.85	18	0.036	0.040
800.0	792.8	7.693	34.549	26.965	121.30	15.367	1494.01	7.61	19	0.027	0.022
900.0	891.7	6.798	34 487	27.04?	113.95	16.542	1492.12	6.71	17	0.041	0.035
1000.0	990.5	6.016	34.463	27.126	105.87	17.639	1490.64	5.93	18	0.018	0.014
1100.0	1089.3	5.236	34.453	27.214	97.06	18.655	1489.13	5.14	19	0.024	0.019
1200.0	1188.1	4.679	34.468	27.290	89.61	19.583	1488.54	4.58	16	0.015	0.012
1300.0	1286.8	4.210	34.490	27.359	82.80	20.444	1488.26	4.11	21	0.010	0.005
1400.0	1385.4	3.725	34.518	27.431	75.41	21.235	1487.93	3.62	21	0.009	0.006
1500.0	1484.0	3.441	34.541	27.477	70.97	21.964	1488.45	3.33	21	0 008	0.005
1600.0	1582.6	3.236	34.554	27.507	68.13	22.661	1489.24	3.12	23	0.009	0.006
1700.0	1681.1	2.967	34.577	27.551	63.73	23.315	1489.78	2.84	21	0.014	0.010
1800.0	1779.6	2.758	34.600	27.588	60.00	23.930	1490.61	2.63	19	0.008	0.005
1900.0	1878.0	2.572	34.623	27.622	56.59	24.512	1491.51	2.44	17	0.005	0.003
2000.0	1976.4	2.433	34.645	27.652	53.73	25.063	1492.61	2.29	19	0.003	0.000
2100.0	2074.7	2.343	34.657	27.669	52.24	25.595	1493.92	2.19	20	0.005	0.004
2200.0	2173.0	2.268	34.666	27.682	51.09	26.110	1495.29	2.11	20	0.003	0.004
2300.0	2271.3	2.171	34.680	27.702	49.26	26.610	1496.56	2.01	21	0.004	0.002
2400.0	2369.5	2.098	34.687	27.713	48.21	27.097	1497.94	1.92	18	0.007	0.005
2500.0	2467.6	2.017	34.696	27.727	46.90	27 568	1499.29	1 84	19	0.000	0.004
2600.0	2565.7	1.921	34.707	27.743	45.28	28.027	1500.58	1.73	21	0.005	0.000
2700.0	2663.8	1.845	34.717	27.757	43.92	28.474	1501.96	1.65	21	0.000	0.000
2800.0	2761.8	1.751	34.711	27.759	43.40	28.912	1503.23	1.55	20	0.007	0.003
2900.0	2859.8	1.658	34.712	27.767	42.41	29.341	1504.54	1.45	19	0.004	0.002
3000.0	2957.7	1.588	34.713	27.773	41.67	29.760	1505.95	1.37	18	0.004	0.004
3100.0	3055.6	1.512	34.714	27.780	40.79	30.172	1507.35	1.28	22	0.002	0.000
3200.0	3153.4	1.423	34.713	27.786	39.90	30.576	1508.69	1.19	22	0 004	0.001
3300.0	3251.2	1.376	34.708	27.785	39.82	30.974	1510.17	1.13	19	0.004	0.003
3400.0	3349.0	1.315	34.708	27.789	39.19	31.368	1511.63	1.06	18	0.005	0.004
3500.0	3446.7	1.267	34.709	27.793	38 67	31.757	1513.16	1.01	17	0 003	0.000
3600.0	3544.4	1.229	34.706	27.794	38.54	32.143	1514.70	0.96	18	0.003	0.002
3700.0	3642.0	1.210	34.707	27.796	38.41	32.527	1516.35	0.93	18	0.004	0.001
3800.0	3739.6	1.193	34.706	27.796	38.47	32.911	1518.02	0.90	19	0.002	0.000
3900.0	3837.1	1.180	34.702	27.794	38.70	33.295	1519.71	0.88	17	0.003	0.003
4000.0	3934.6	1.171	34.706	27.797	38.52	33.679	1521.37	0.86	18	0.002	0.001
4100.0	4032.1	1.165	34.706	27.798	38 63	34.065	1523.11	0.84	17	0.003	0.000
4200.0	4129.5	1.166	34.711	27.802	38.48	34.451	1524.87	0.83	21	0 003	0.001
4300.0	4226.8	1.171	34.707	27.798	39.06	34.839	1526.61	0.81	21	0 002	0 001
4400.0	4324.2	1.172	34.709	27.800	39.15	35.231	1528.37	0.82	19	0 002	0 000
4500.0	4421.4	1.175	34.710	27.801	39.25	35.621	1530 14	0 81	21	0.003	0 004
4600.0	4518.7	1.181	34.707	27.797	39.81	36.019	1531.94	0.80	18	0.002	0 003
4700 0	4615.9	1.185	34.709	27.799	39.91	36.416	1533.71	0 80	23	0 003	0.000
4780.0	4693.6	1.189	34.709	27.798	40.15	36.736	1535.11	0.79	29	0.003	0.001

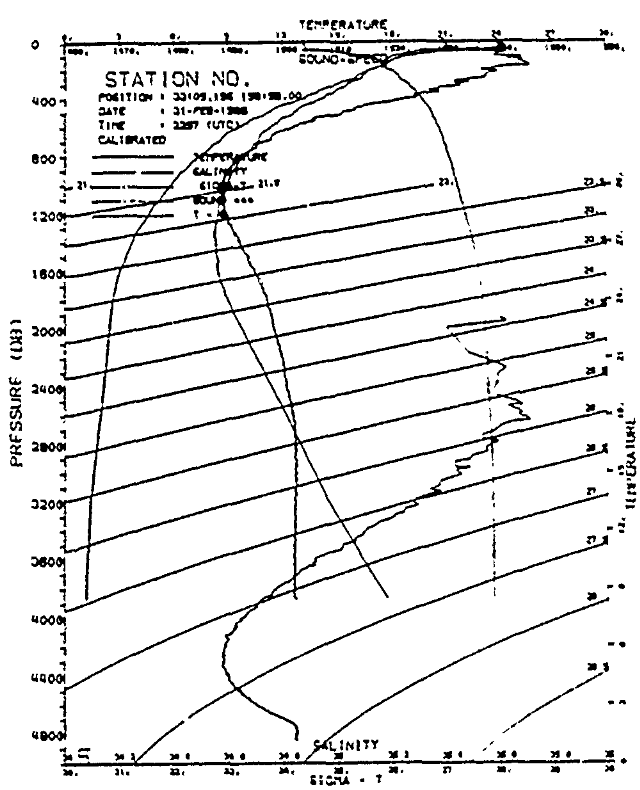




SHIP : HMAS COOK - Plessey
STATION NUMBER : 5 (THROUGH THE CRUISE)
STATION NUMBER : 5 (THROUGH THE YEAR)
DATE : 31-FEB-1986 (DAY NUMBER 62)
START TIME : 2257 GMT = Z
CRUISE : CK01/86
POSITION : 33 05.19S 150:59.00E
CAST DEPTH : 3800 METRES
BOTTOM DEPTH : 3884 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	23.040	35.528	24.322	359.73	0.360	1530.50	23.05	14	0.008	0.006
20.0	19.9	23.002	35.524	24.332	359.13	0.719	1530.47	23.00	18	0 032	0.023
30.0	29.8	22.950	35.541	24.360	356.85	1.077	1530.53	22.94	22	0.014	0.015
40.0	39.7	22.893	35.542	24.377	355.63	1.433	1530.53	22.88	17	0.015	0.011
50.0	49.6	22.867	35 544	24.387	355.09	1.789	1530.63	22.86	22	0.006	0.006
60.0	59.6	22.437	35.375	24.381	355.99	2.144	1529.17	22.42	18	0.542	0.707
70.0	69.5	20.897	35.461	24.875	309.23	2.477	1525.47	20.88	19	0.257	0.210
80.0	79.4	20.349	35.534	25.078	290.24	2.776	1524.30	20.33	20	0.136	0.143
90.0	89.3	19.724	35.497	25.215	277.47	3 060	1522.66	19.71	18	0.198	0.185
100.0	99.3	19.114	35.499	25.375	262.54	3.330	1521.08	19.10	18	0.229	0.214
120.0	119.1	18.399	35.556	25.599	241.79	3.827	1519.53	18.38	19	0.138	0.167
140.0	139.0	18.015	35.582	25.715	231.42	4.297	1518.81	17.99	18	0.065	0.071
160 0	158.8	17.789	35.620	25.801	223.91	4.751	1518.58	17.76	19	0.009	0.011
180.0	178.7	17.433	35.520	25.810	223.54	5.198	1517.72	17.40	18	0.125	0.161
200.0	198.5	16 856	35.443	25.890	216.51	5.638	1516.21	16.82	17	0.093	0.097
220.0	218.3	16.504	35.487	26.006	206.00	6.058	1515.57	16.47	17	0.043	0.055
240.0	238.2	16.177	35.458	26.060	201.40	6.466	1514.86	16.14	19	0.028	0.027
260.0	258.0	15.962	35.426	26.085	199.54	6.866	1514.46	15.92	21	0.074	0.097
280.0	277.8	15.343	35.328	26.149	193.79	7.259	1512.70	15.30	18	0.124	0.113
300.0	297.7	14.951	35.351	26.254	184.27	7.636	1511.90	14.91	22	0.052	0.041
320.0	317.5	14.667	35.303	26.279	182.39	8.001	1511.23	14.62	20	0.100	0.129
340.0	337.3	14.155	35.246	26.345	176.45	8.359	1509.86	14.11	19	0.072	0.085
360.0	357.1	13.921	35.253	26.400	171.61	8.704	1509.48	13.87	22	0.068	0.086
380.0	377.0	13.414	35.178	26.448	167.38	9.044	1508.06	13.36	18	0.051	0.045
400.0	396.8	13.150	35.155	26.483	164.38	9.374	1507.47	13.09	16	0.073	0.090
420 0	416.6	12.661	35.098	26.537	159.42	9.697	1506.14	12.60	16	0.049	0.050
440.0	436.4	12.154	35.025	26.579	155.59	10.013	1504.63	12.10	19	0.071	0.068
460.0	456.2	11.708	34.974	26.625	151.38	10.320	1503.41	11.65	21	0.061	0.070
480.0	476.1	11.434	34.957	26.663	148.03	10.619	1502.79	11.37	17	0.021	0.034
500.0	495.9	11.119	34.909	26.683	146.30	10.914	1501.97	11.06	21	0.038	0.033
550.0	545.4	10.225	34.806	26.762	139.12	11.633	1499.49	10.16	19	0.035	0.025
600.0	594.9	9.544	34.729	26.817	134.18	12.320	1497.81	9.47	20	0.028	0.023
700.0	693.9	8.506	34.612	26.892	127.66	13.620	1495.48	8.43	18	0.042	0.046
800.0	792.8	7.427	34.527	26.986	118.84	14.848	1492.93	7.35	20	0.038	0.029
900.0	891.7	6.565	34.469	27.059	111.93	15.994	1491.16	6.48	17	0.049	0.051
1000.0	990.6	5.838	34.460	27.147	103.58	17.064	1489.93	5.75	19	0.019	0.015
1100.0	1089.4	5.248	34.457	27.216	96.93	18.065	1489.17	5.15	21	0.024	0.022
1200.0	1188.1	4.640	34.467	27.294	89.15	18.990	1488.36	4.54	19	0.012	0.014
1300.0	1286.8	4.101	34.486	27.367	81.71	19.845	1487.80	4.00	17	0.016	0.011
1400.0	1385.5	3.714	34.512	27.427	75.75	20.626	1487.88	3.61	17	0.010	0.012
1500.0	1484.1	3.363	34.547	27.489	69.56	21.352	1488.12	3.25	20	0.003	0.004
1600.0	1582.6	3.024	34.567	27.537	64.53	22.026	1488.36	2.91	22	0.009	0.006
1700.0	1681.2	2.813	34.593	27.577	60.67	22.650	1489.17	2.69	20	0.004	0.004
1800.0	1779.6	2.634	34.611	27.607	57.70	23.241	1490.13	2.51	20	0.007	0.004
1900.0	1878.1	2.526	34.627	27.629	55.73	23.809	1491.33	2.39	17	0.005	0.004
2000.0	1976.4	2.452	34.638	27.645	54.49	24.361	1492.69	2.31	19	0.000	0.000
2100.0	2074.8	2.352	34.652	27.664	52.69	24.897	1493.96	2.20	20	0.002	0.003
2200.0	2173.1	2.278	34.663	27.680	51.40	25.418	1495.31	2.12	21	0.004	0.003
2300.0	2271.3	2.209	34.670	27.691	50.48	25.925	1496.72	2.04	19	0.000	0.003
2400.0	2369.5	2.143	34.681	27.705	49.27	26.421	1498.14	1.97	19	0.005	0.003
2500.0	2467 7	2.050	34.692	27.721	47.66	26.905	1499.44	1.87	18	0.004	0.002
2600.0	2565.8	1.952	34.704	27.738	45.87	27.373	1500.71	1.76	20	0.004	0.003
2700.0	2663.8	1.848	34.708	27.750	44.54	27.825	1501.96	1.65	17	0.004	0.004
2800.0	2761.9	1.755	34.709	27.758	43.55	28.265	1503.28	1.55	16	0.003	0.004
2900.0	2859 8	1.652	34.709	27.766	42.50	28.695	1504.51	1.44	18	0.002	0 003
3000.0	2957.8	1.578	34.712	27.774	41.56	29.114	1505.94	1.36	19	0.004	0 002
3100.0	3055.7	1.491	34.712	27.779	40.69	29.525	1507.24	1.26	18	0.001	0.000
3200.0	3153.5	1.411	34.714	27.787	39.66	29.928	1508 63	1.18	19	0.003	0.000
3300.0	3251.3	1.359	34.712	27.789	39.33	30.325	1510.11	1.12	22	0 000	0 000
3400.0	3349.1	1.321	34.709	27.790	39.21	30.719	1511.68	1.07	16	0.002	0 002
3500.0	3446.8	1.293	34.706	27.789	39.24	31.111	1513.25	1.03	16	0.004	0.002
3600.0	3544.4	1.248	34.709	27.794	38.65	31.501	1514 80	0.98	22	0.003	0.001
3700.0	3642.1	1.218	34 707	27.795	38.55	31.887	1516.39	0.94	19	0.004	0.003
3800.0	3739 6	1.203	34.707	27.796	38.53	32.273	1518 05	0.91	19	0.002	0.000
3870.0	3807.9	1.190	34.716	27.804	37.83	32.543	1519.09	0.89	5	0.003	0.002



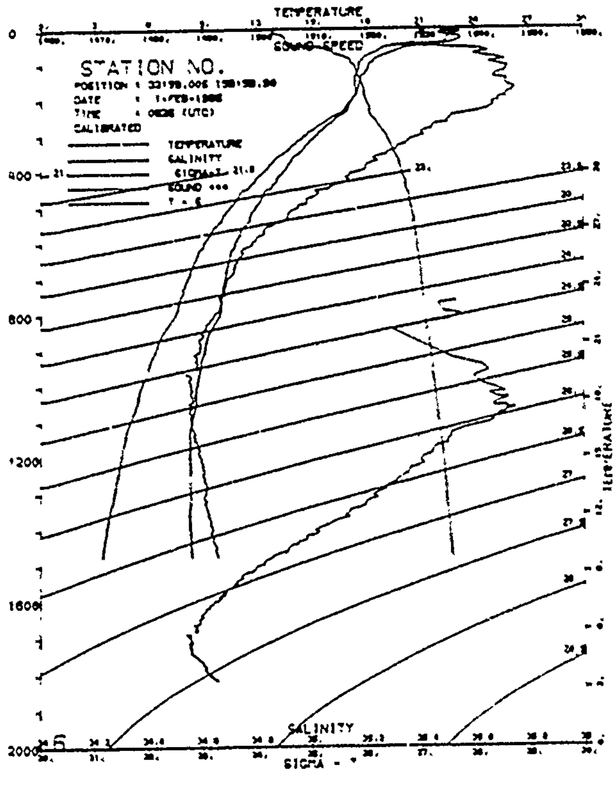


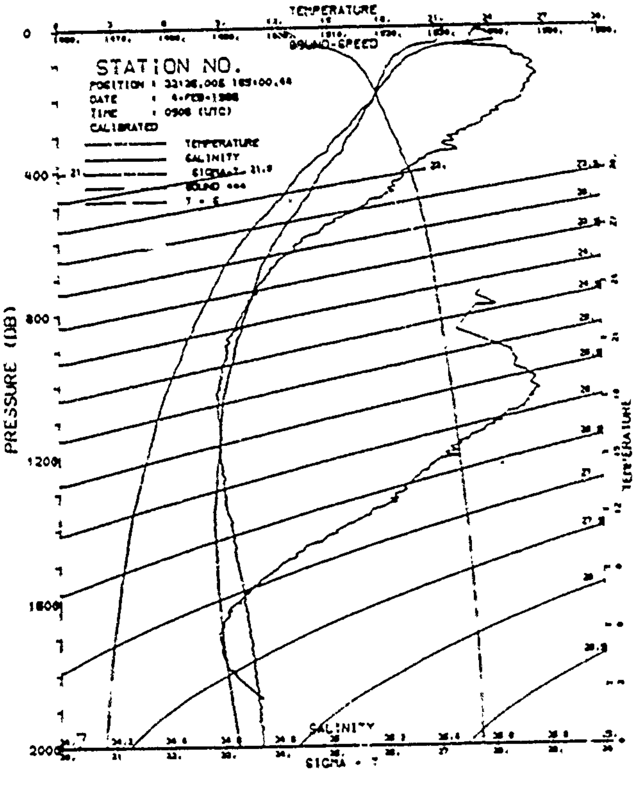
SHIP : HMAS COOK - Plessey
STATION NUMBER : 6 (THROUGH THE CRUISE)
STATION NUMBER : 6 (THROUGH THE YEAR)
DATE : 01-FEB-1986 (DAY NUMBER 32)
START TIME : 0626 GMT = Z
CRUISE : CK01/86
POSITION : 32:59.00S 159 59.90E
CAST DEPTH : 1436 METRES
BOTTOM DEPTH : 1535 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	23.106	35.398	24.206	370.75	0.371	1530.37	23.10	22	0.129	0.204
20.0	19.9	22.573	35.427	24.382	354.39	0.733	1529.23	22.57	21	0.075	0.032
30.0	29.8	22.454	35.460	24.440	349.20	1.085	1529.13	22.45	19	0.026	0.036
40.0	39.7	22.307	35.427	24.458	347.92	1.433	1528.84	22.30	19	0.059	0.077
50.0	49.6	21.282	35.249	24.608	333.88	1.774	1525.59	21.27	20	0.712	0.702
60.0	59.6	19.840	35.532	25.211	276.78	2.080	1522.54	19.83	20	0.144	0.147
70.0	69.5	19.364	35.529	25.333	265.49	2.351	1521.39	19.35	21	0.176	0.211
80.0	79.4	18.731	35.556	25.516	248.39	2.608	1519.78	18.72	20	0.150	0.109
90.0	89.3	18.427	35.612	25.636	237.35	2.851	1519.24	18.41	16	0.044	0.042
100.0	99.3	18.184	35.574	25.667	234.66	3.087	1518.61	18.17	15	0.094	0.085
120.0	119.1	18.009	35.617	25.743	228.07	3.547	1518.51	17.99	19	0.028	0.027
140.0	139.0	17.678	35.594	25.807	222.58	4.000	1517.86	17.65	20	0.030	0.053
160.0	158.8	17.580	35.628	25.857	218.51	4.441	1517.91	17.55	20	0.021	0.017
180.0	178.7	17.496	35.635	25.883	216.68	4.875	1518.01	17.47	13	0.022	0.026
200.0	198.5	17.211	35.591	25.919	213.88	5.306	1517.42	17.18	19	0.057	0.049
220.0	218.3	16.887	35.570	25.980	208 63	5.730	1516.78	16.85	19	0.032	0.042
240.0	238.2	16.499	35.452	25.981	208.99	6.146	1515.68	16.46	21	0.133	0.161
260.0	258.0	15.823	35.402	26.098	198.25	6.554	1513.99	15.78	22	0.073	0.077
280.0	277.8	15.242	35.343	26.184	190.50	6.944	1512.40	15.20	16	0.058	0.063
300.0	297.7	14.693	35.299	26.270	182.63	7.318	1510.97	14.65	16	0.050	0.075
320.0	317.5	14.178	35.254	26.347	175.72	7.677	1509.62	14.13	19	0.041	0.032
340.0	337.3	13.753	35.205	26.398	171.20	8.025	1508.49	13.70	20	0.052	0.058
360.0	357.2	13.176	35.133	26.461	165.46	8.361	1506.83	13.13	19	0.094	0.079
380.0	377.0	12.801	35.102	26.512	160.85	8.687	1505.86	12.75	17	0.073	0.083
400.0	396.8	12.435	35.075	26.564	156.25	9.003	1504.96	12.38	22	0.064	0.071
420.0	416.6	11.903	35.020	26.608	152.22	9.313	1503.69	11.93	19	0.068	0.058
440.0	436.4	11.692	34.974	26.628	150.63	9.615	1502.94	11.64	17	0.059	0.059
460.0	456.3	11.150	34.919	26.686	145.22	9.913	1501.36	11.09	22	0.041	0.032
480.0	476.1	10.892	34.886	26.706	143.47	10.202	1500.78	10.83	18	0.050	0.050
500.0	495.9	10.548	34.838	26.731	141.28	10.487	1499.80	10.49	17	0.053	0.045
550.0	545.4	9.845	34.747	26.781	136.92	11.180	1498.03	9.78	22	0.059	0.057
600.0	594.5	9.097	34.664	26.840	131.55	11.849	1496.07	9.03	15	0.035	0.025
700.0	693.9	8.172	34.579	26.917	124.83	13.127	1494.16	8.10	21	0.032	0.036
800.0	792.8	7.513	34.527	26.974	120.15	14.346	1493.24	7.43	16	0.024	0.027
900.0	891.7	6.376	34.470	27.086	109.12	15.490	1490.41	6.29	20	0.013	0.013
1000.0	990.6	5.600	34.432	27.154	102.36	16.549	1488.92	5.51	19	0.027	0.023
1100.0	1089.4	4.965	34.434	27.231	94.81	17.539	1488.00	4.87	18	0.021	0.019
1200.0	1188.1	4.469	34.466	27.312	87.02	18 446	1487.64	4.37	18	0.015	0.007
1300.0	1286.8	4.095	34.485	27.367	81.70	19.288	1487 79	3.99	16	0.007	0.005
1400.0	1385.5	3 685	34.507	27.426	75.72	20.077	1487.75	3.58	19	0.007	0.005
1470.0	1454.5	3.460	34.528	27.465	71.93	20.595	1488.04	3.35	41	0.006	0.004

SHIP : HMAS COOK - Plessey
STATION NUMBER : 7 (THROUGH THE CRUISE)
STATION NUMBER : 7 (THROUGH THE YEAR)
DATE : 04-FEB-1986 (DAY NUMBER 35)
START TIME : 0506 GMT = Z
CRUISE : CK01/86
POSITION : 32.26.00S 165:00.44E
CAST DEPTH : 2053 METRES
BOTTOM DEPTH : 2906 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	23.474	35.501	24.178	373.48	0.373	1531.42	23.47	33	0 106	0 117
20.0	19.9	23 070	35.542	24.326	359.74	0.740	1530.58	23.07	20	0 079	0.080
30.0	29.8	22.923	35.563	24.385	354.52	1.097	1530.42	22.92	20	0.018	0 017
40.0	39.7	22.885	35.567	24.399	353.54	1.451	1530.50	22 88	19	0 007	0 006
50.0	49.6	22.483	35.436	24.414	352.43	1.804	1529.13	22.47	18	0.536	0.657
60.0	59.6	20.913	35.566	24.950	301.70	2.131	1525.44	20.90	18	0.254	0.238
70.0	69.5	20.307	35.623	25.157	282.37	2.423	1524.08	20.29	18	0.144	0.138
80.0	79.4	19.886	35 632	25.275	271.41	2.709	1523.09	19.87	19	0 177	0.197
90.0	89.4	19.404	35.672	25.432	256.81	2.964	1522.03	19.39	18	0 063	0 050
100.0	99.3	19.179	35.688	25.502	250.44	3.218	1521.56	19.16	19	0.069	0.051
120.0	119.1	18.737	35.696	25.622	239.74	3.738	1520.65	18 72	19	0 074	0 081
140.0	139.0	18.470	35.713	25.702	232.74	4.130	1520.25	18 45	19	0.030	0 046
160.0	158.8	18.112	35.690	25.774	226.48	4' 39	1519.53	18.08	20	0.035	0 031
180.0	178.7	17.805	35.679	25.842	220.67	5.[illegible]87	1519.00	17.77	18	0.025	0.023
200.0	198.5	17.568	35.662	25.887	217.02	5.525	1518.58	17 53	17	0.029	0 026
220.0	218.3	17.274	35.613	25.921	214.35	5.956	1517.93	17.24	18	0.068	0.098
240.0	238.2	16.815	35.574	26.000	207.30	6.378	1516.87	16 78	18	0 025	0.038
260.0	258.0	16.498	35.524	26.036	204.40	6.790	1516.15	16.46	19	0.075	0.087
280.0	277.9	16.200	35.498	26.086	200.21	7.193	1515.58	16.15	20	0 054	0.060
300.0	297.7	15.728	35.438	26.148	194.73	7.589	1514.37	15.68	18	0.075	0.081
320.0	317.5	15.273	35.407	26.226	187.70	7.973	1513.30	15.22	18	0.042	0.034
340.0	337.3	14.995	35.396	26.279	183.09	8.345	1512.75	14.94	18	0.019	0.029
360.0	357.2	14.635	35.320	26.300	181.55	8.709	1511.78	14.58	19	0 122	0.126
380.0	377.0	14.104	35.285	26.386	173.59	9.062	1510.40	14.05	17	0 058	0 057
400.0	396.8	13.616	35.242	26.455	167.31	9.405	1509 09	13 56	21	0.062	0.061
420.0	416.6	13.258	35.221	26.512	162.22	9.735	1508.25	13 20	21	0 029	0 020
440.0	436.5	12.926	35.173	26.542	159.69	10.057	1507 35	12.87	19	0.086	0.091
460.0	456.3	12.625	35.160	26.593	155.20	10.371	1506.68	12.56	19	0 058	0.040
480.0	476.1	12.352	35.132	26.624	152.49	10.679	1506.05	12 29	19	0 045	0 059
500.0	495.9	11.935	35.083	26.667	148.62	10.980	1504.90	11 87	20	0.028	0.036
550.0	545.4	10.981	34.949	26.740	141.97	11.710	1502.27	10 91	20	0 043	0 052
600.0	594.9	10.149	34.838	26.800	136.50	12.406	1500.06	10 08	22	0.037	0 036
700.0	693.9	8.845	34.699	26.908	126.71	13.717	1496.80	8.77	21	0.028	0.025
800.0	792.9	7.826	34.611	26.994	118.77	14.945	1494.50	7 74	20	0 032	0.027
900.0	891.8	6.860	34.555	27 088	109.88	16.091	1492.39	6.77	18	0.021	0.022
1000.0	990.6	6.040	34.521	27.169	101.92	17.152	1490.77	5 95	19	0 026	0 021
1100.0	1089.4	5.387	34.522	27.251	94.03	18.130	1489.79	5 29	21	0.013	0 011
1200.0	1188.2	4.855	34.523	27.314	87.89	19.039	1489.28	4.75	17	0 019	0 017
1300.0	1286.9	4.321	34.538	27.385	80.71	19.881	1488.75	4.22	21	0 018	0 014
1400.0	1385.5	3 862	34.564	27.454	73.76	20 653	1488.54	3 75	20	0 009	0 005
1500.0	1484.2	3.534	34.583	27.501	69 04	21.368	1488.82	3.42	21	0 015	0 012
1600.0	1582.7	3.229	34.604	27.547	64.40	22.031	1489.24	3 11	15	0.009	0 008
1700.0	1681.2	2.945	34.628	27.593	59.70	22.651	1489 74	2 82	21	0 011	0 005
1800.0	1779.7	2.752	34.643	27.622	56.83	23.233	1490.59	2.62	21	0 005	0 005
1900.0	1878.2	2.584	34 656	27.648	54.32	23.788	1491.57	2.45	20	0.002	0 000
2000.0	1976.5	2.450	34.669	27.669	52.22	24.320	1492.66	2.31	19	0 007	0.005
2020.0	1996.2	2.428	34.672	27.674	51 83	24.424	1492 89	2.28	91	0 004	0 004



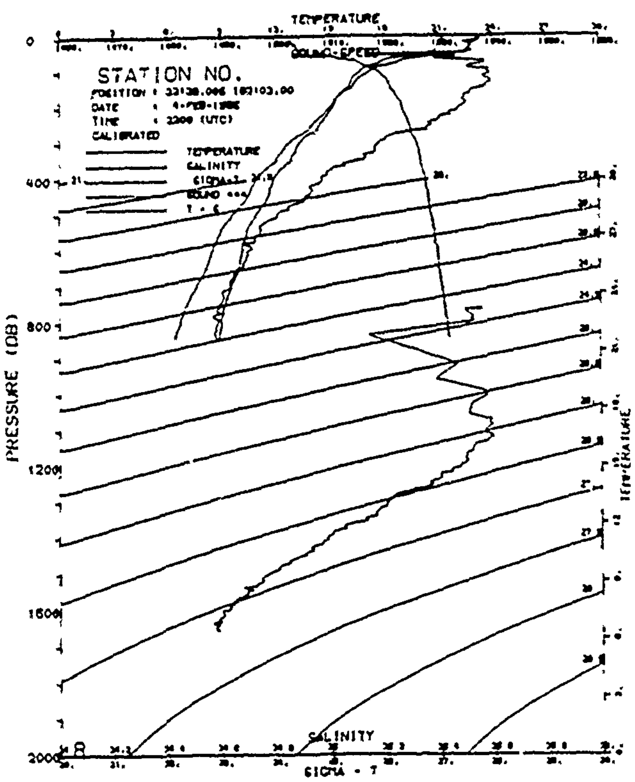


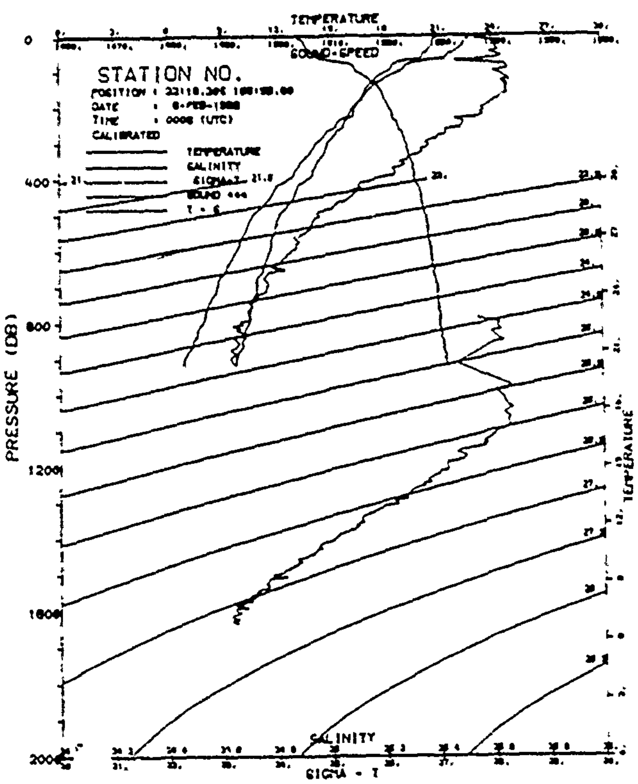
SHIP : HMAS COOK - Plessey
STATION NUMBER : 8 (THROUGH THE CRUISE)
STATION NUMBER : 8 (THROUGH THE YEAR)
DATE : 04-FEB-1986 (DAY NUMBER 35)
START TIME : 2200 GMT = Z
CRUISE : CK01/86
POSITION : 32:39.00S 163:03.00E
CAST DEPTH : 864 METRES
BOTTOM DEPTH : 906 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	23.206	35.500	24.255	366.11	0.366	1530.81	23.20	25	0.004	0.005
20.0	19.9	23.002	35.449	24.275	364.57	0.731	1530.27	23.00	20	0.147	0.160
30.0	29.8	22.755	35.470	24.362	356.63	1.092	1529.88	22.75	21	0.038	0.047
40.0	39.7	22.606	35.468	24.403	353.09	1.447	1529.65	22.60	18	0.036	0.033
50.0	49.6	22.401	35.360	24.380	355.69	1.801	1528.91	22.39	18	0.176	0.416
60.0	59.6	20.347	35.350	24.938	302.83	2.130	1523.42	20.34	22	0.441	0.334
70.0	69.5	19.034	35.449	25.357	263.19	2.413	1520.19	19.02	19	0.257	0.140
80.0	79.4	18.488	35.484	25.522	247.83	2.669	1518.87	18.47	21	0.213	0.248
90.0	89.3	17.676	35.471	25.713	229.87	2.908	1516.71	17.66	20	0.209	0.196
100.0	99.3	17.292	35.528	25.851	217.11	3.132	1515.89	17.28	19	0.094	0.095
120.0	119.1	16.666	35.520	25.994	204.06	3.553	1514.34	16.65	21	0.083	0.074
140.0	139.0	16.368	35.518	26.062	198.18	3.954	1513.78	16.35	20	0.049	0.043
160.0	158.8	15.807	35.459	26.146	190.72	4.346	1512.32	15.78	20	0.064	0.067
180.0	178.7	15.359	35.428	26.223	183.84	4.720	1511.23	15.33	20	0.071	0.066
200.0	198.5	15.085	35.420	26.278	179.17	5.082	1510.74	15.05	21	0.044	0.051
220.0	218.3	14.703	35.377	26.329	174.82	5.436	1509.79	14.67	20	0.054	0.048
240.0	238.2	14.290	35.317	26.371	171.20	5.783	1508.72	14.25	20	0.055	0.084
260.0	258.0	13.919	35.289	26.428	166.24	6.119	1507.83	13.88	21	0.042	0.034
280.0	277.8	13.349	35.158	26.445	164.91	6.451	1506.03	13.31	20	0.125	0.126
300.0	297.7	12.779	35.117	26.528	157.29	6.772	1504.50	12.74	21	0.072	0.077
320.0	317.5	12.456	35.102	26.581	152.69	7.082	1503.79	12.41	19	0.021	0.020
340.0	337.3	12.166	35.063	26.607	150.53	7.386	1503.06	12.12	21	0.034	0.026
360.0	357.2	11.797	34.985	26.617	149.84	7.686	1502.01	11.75	21	0.087	0.077
380.0	377.0	11.371	34.936	26.658	146.11	7.983	1500.81	11.32	18	0.050	0.052
400.0	396.8	10.991	34.905	26.703	142.05	8.272	1499.82	10.94	21	0.032	0.034
420.0	416.6	10.800	34.874	26.714	141.34	8.554	1499.44	10.75	17	0.040	0.042
440.0	436.4	10.577	34.860	26.743	138.88	8.835	1498.98	10.52	21	0.029	0.028
460.0	456.3	10.359	34.838	26.763	137.20	9.112	1498.53	10.30	19	0.020	0.019
480.0	476.1	10.016	34.785	26.782	135.61	9.386	1497.52	9.96	21	0.055	0.058
500.0	495.9	9.675	34.739	26.804	133.62	9.655	1496.60	9.62	21	0.047	0.036
550.0	545.4	8.990	34.674	26.865	128.13	10.310	1494.84	8.93	16	0.018	0.019
600.0	594.9	8.519	34.626	26.902	125.04	10.944	1493.86	8.46	22	0.027	0.034
700.0	693.9	7.576	34.556	26.987	117.41	12.163	1491.87	7.51	21	0.027	0.027
800.0	792.9	6.696	34.509	27.074	109.41	13.297	1490.03	6.62	21	0.006	0.004
850.0	842.3	6.415	34.510	27.112	106.07	13.836	1489.75	6.34	18	0.003	0.005

SHIP : HMAS COOK - Plessey
STATION NUMBER : 9 (THROUGH THE CRUISE)
STATION NUMBER : 9 (THROUGH THE YEAR)
DATE : 06-FEB-1986 (DAY NUMBER 37)
START TIME : 0006 GMT = Z
CRUISE : CK01/86
POSITION : 32:18.30S 166:59.80E
CAST DEPTH : 0 METRES
BOTTOM DEPTH : 983 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	22.683	35.494	24.401	352.17	0.352	1529.50	22.68	26	0.098	0.084
20.0	19.9	22.519	35.551	24.491	344.00	0.700	1529.33	22.52	19	0.015	0.006
30.0	29.8	22.422	35.557	24.523	341.29	1.043	1529.25	22.42	17	0.045	0.055
40.0	39.7	22.174	35.560	24.596	334.72	1.381	1528.75	22.17	17	0.098	0.089
50.0	49.6	21.860	35.539	24.668	328.21	1.712	1528.06	21.85	21	0.193	0.207
60.0	59.6	21.557	35.573	24.779	318.04	2.035	1527.48	21.55	19	0.031	0.034
70.0	69.5	20.808	35.455	24.694	307.40	2.348	1525.37	20.79	22	0.630	0.672
80.0	79.4	19.519	35.542	25.303	268.74	2.636	1522.14	19.50	20	0.196	0.156
90.0	89.4	19.222	35.591	25.417	258.18	2.900	1521.58	19.21	17	0.043	0.043
100.0	99.3	19.014	35.560	25.447	255.72	3.157	1521.06	19.00	17	0.131	0.166
120.0	119.1	18.145	35.582	25.683	233.84	3.644	1518.93	18.12	19	0.088	0.067
140.0	139.0	17.526	35.589	25.841	219.38	4.099	1517.44	17.50	18	0.062	0.050
160.0	158.8	17.116	35.584	25.936	210.89	4.529	1516.56	17.09	21	0.046	0.043
180.0	178.7	16.815	35.544	25.977	207.59	4.947	1515.94	16.79	19	0.077	0.101
200.0	198.5	16.386	35.503	26.046	201.56	5.356	1514.92	16.35	21	0.047	0.063
220.0	218.3	16.100	35.493	26.105	196.54	5.753	1514.38	16.06	20	0.029	0.020
240.0	238.2	15.525	35.423	26.182	189.62	6.143	1512.86	15.49	20	0.043	0.032
260.0	258.0	15.271	35.390	26.213	187.13	6.519	1512.32	15.23	18	0.070	0.095
280.0	277.9	14.747	35.339	26.290	180.28	6.885	1510.93	14.70	21	0.063	0.076
300.0	297.7	14.313	35.289	26.345	175.38	7.241	1509.82	14.27	22	0.078	0.082
320.0	317.5	14.059	35.266	26.381	172.42	7.588	1509.31	14.01	23	0.072	0.077
340.0	337.3	13.714	35.220	26.418	169.28	7.930	1508.44	13.67	21	0.078	0.084
360.0	357.2	13.331	35.199	26.481	163.66	8.263	1507.54	13.28	21	0.015	0.010
380.0	377.0	13.070	35.166	26.508	161.45	8.590	1506.94	13.02	19	0.017	0.013
400.0	396.8	12.781	35.102	26.516	161.02	8.913	1506.18	12.73	20	0.096	0.105
420.0	416.6	12.120	35.025	26.586	154.44	9.229	1504.20	12.06	20	0.084	0.060
440.0	436.5	11.850	35.017	26.632	150.42	9.534	1503.66	11.79	20	0.022	0.026
460.0	456.3	11.629	34.982	26.646	149.35	9.833	1503.16	11.57	19	0.050	0.052
480.0	476.1	11.235	34.935	26.682	146.05	10.129	1502.09	11.17	19	0.057	0.066
500.0	495.9	10.780	34.879	26.722	142.39	10.418	1500.77	10.72	19	0.050	0.043
550.0	545.4	10.331	34.833	26.765	138.92	11.119	1499.95	10.26	18	0.022	0.028
600.0	594.9	9.817	34.777	26.809	135.26	11.804	1498.87	9.75	20	0.042	0.040
700.0	693.9	8.716	34.681	26.914	125.94	13.116	1496.39	8.64	20	0.019	0.016
800.0	792.9	7.940	34.585	26.957	122.43	14.354	1494.97	7.86	20	0.047	0.015
900.0	891.8	6.937	34.546	27.070	111.69	15.521	1492.73	6.85	19	0.028	0.020
920.0	911.5	6.850	34.564	27.096	109.34	15.742	1492.72	6.76	45	0.012	0.012



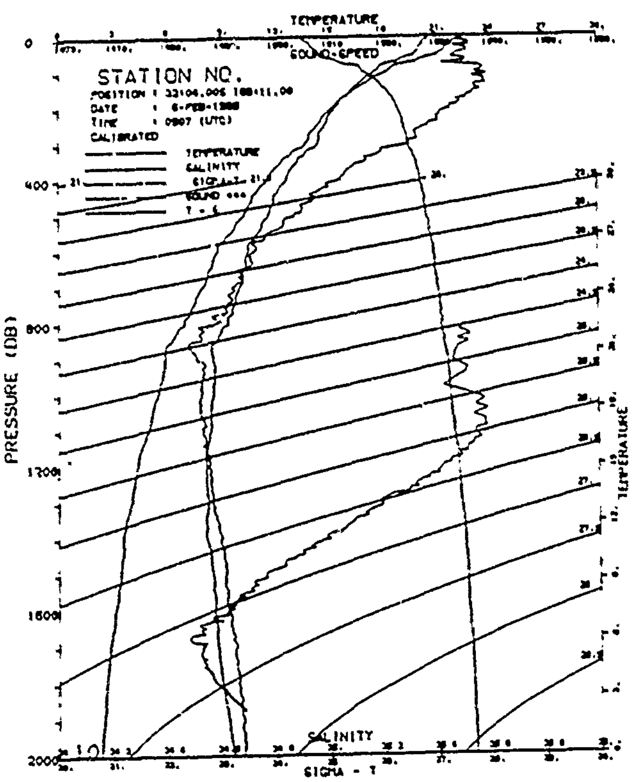


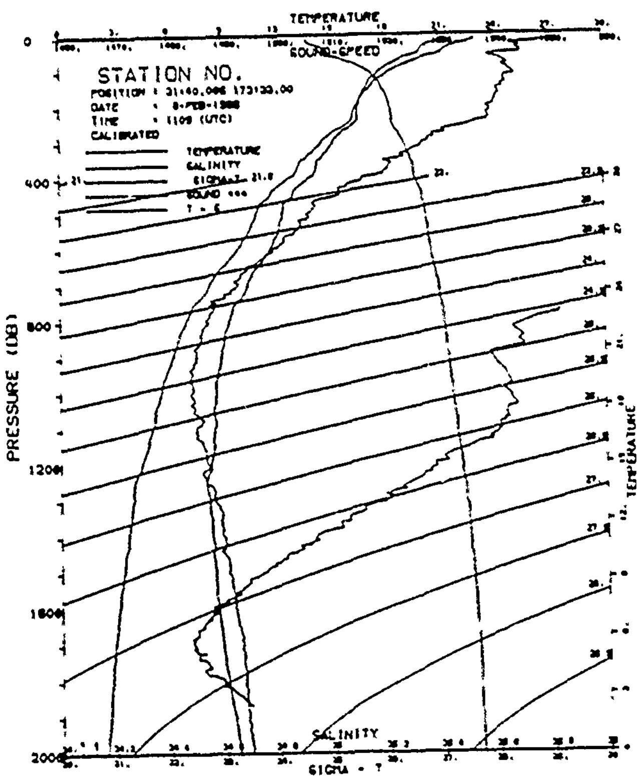
SHIP : HMAS COOK - Plessey
STATION NUMBER : 10 (THROUGH THE CRUISE)
STATION NUMBER : 10 (THROUGH THE YEAR)
DATE : 06-FEB-1985 (DAY NUMBER 37)
START TIME : 0907 GMT - Z
CRUISE : CK01/86
POSITION : 32:04.00S 169:11.00E
CAST DEPTH : 2081 METRES
BOTTOM DEPTH : 4070 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
0.0	0.0	22.388	35.474	24.470	345.27	0.000	1528.62	22.39	5	0.009	0.009
10.0	9.9	22.188	35.446	24.505	342.24	0.344	1528.13	22.19	24	0.149	0.163
20.0	19.9	21.876	35.484	24.622	331.52	0.681	1527.53	21.87	20	0.028	0.024
30.0	29.8	21.623	35.454	24.669	327.34	1.010	1526.97	21.62	20	0.126	0.119
40.0	39.7	21.455	35.474	24.731	321.83	1.335	1526.72	21.45	20	0.027	0.035
50.0	49.6	21.178	35.441	24.783	317.27	1.654	1526.09	21.17	19	0.092	0.097
60.0	59.6	20.511	35.424	24.951	301.62	1.964	1524.37	20.50	20	0.251	0.228
70.0	69.5	19.942	35.466	25.134	284.51	2.257	1522.97	19.93	18	0.133	0.152
80.0	79.4	18.900	35.441	25.383	261.05	2.529	1520.05	18.89	23	0.352	0.263
90.0	89.4	18.471	35.528	25.560	244.49	2.782	1519.31	18.46	20	0.051	0.069
100.0	99.3	18.211	35.511	25.613	239.83	3.024	1518.62	18.19	15	0.085	0.108
120.0	119.1	17.386	35.536	25.834	219.36	3.484	1516.63	17.37	18	0.057	0.061
140.0	139.0	16.808	35.506	25.950	208.90	3.912	1515.15	16.78	16	0.091	0.084
160.0	158.8	16.227	35.493	26.075	197.49	4.317	1513.74	16.20	20	0.080	0.083
180.0	178.7	15.656	35.453	26.175	188.48	4.704	1512.26	15.63	21	0.083	0.105
200.0	198.5	15.252	35.400	26.226	184.20	5.075	1511.29	15.22	17	0.089	0.092
220.0	218.3	14.824	35.368	26.295	178.09	5.438	1510.24	14.79	21	0.054	0.056
240.0	238.2	14.577	35.355	26.339	174.40	5.790	1509.79	14.54	16	0.016	0.023
260.0	258.0	14.245	35.294	26.363	172.50	6.137	1508.97	14.21	19	0.057	0.069
280.0	277.9	13.931	35.279	26.418	167.72	6.477	1508.30	13.89	19	0.006	0.005
300.0	297.7	13.752	35.248	26.432	166.93	6.812	1508.00	13.71	20	0.033	0.035
320.0	317.5	13.113	35.142	26.481	162.50	7.143	1506.06	13.07	20	0.128	0.119
340.0	337.4	12.599	35.085	26.539	157.20	7.461	1504.65	12.55	20	0.117	0.121
360.0	357.2	12.259	35.050	26.579	153.76	7.770	1503.79	12.21	19	0.069	0.084
380.0	377.0	11.847	35.012	26.629	149.26	8.072	1502.70	11.80	22	0.054	0.055
400.0	396.8	11.614	34.996	26.659	146.67	8.368	1502.22	11.56	25	0.023	0.021
420.0	416.6	11.230	34.945	26.691	143.85	8.661	1501.14	11.18	18	0.025	0.024
440.0	436.5	10.940	34.889	26.700	143.20	8.948	1500.37	10.89	18	0.084	0.103
460.0	456.3	10.735	34.892	26.739	139.80	9.229	1500.03	10.68	21	0.010	0.015
480.0	476.3	10.451	34.851	26.758	138.23	9.508	1499.30	10.39	22	0.026	0.012
500.0	495.9	10.262	34.824	26.770	137.34	9.783	1498.93	10.20	22	0.053	0.053
550.0	545.4	9.504	34.721	26.817	133.13	10.456	1496.85	9.44	16	0.054	0.065
600.0	595.0	8.800	34.672	26.893	126.15	11.099	1495.09	8.73	20	0.021	0.027
700.0	693.9	7.918	34.587	26.962	120.27	12.330	1493.31	7.85	20	0.056	0.057
800.0	792.9	6.989	34.533	27.052	111.94	13.484	1491.34	6.91	18	0.014	0.012
900.0	891.8	5.840	34.453	27.140	102.93	14.561	1488.35	5.76	20	0.019	0.011
1000.0	990.6	5.465	34.470	27.200	97.74	15.561	1488.51	5.38	22	0.026	0.024
1100.0	1089.4	4.913	34.476	27.270	91.09	16.504	1487.91	4.82	23	0.014	0.012
1200.0	1188.2	4.326	34.495	27.350	83.05	17.367	1487.16	4.23	20	0.022	0.019
1300.0	1286.9	3.987	34.506	27.395	78.82	18.174	1487.40	3.89	20	0.019	0.014
1400.0	1385.6	3.534	34.539	27.466	71.52	18.922	1487.22	3.43	20	0.000	0.000
1500.0	1484.2	3.382	34.553	27.493	69.30	19.627	1488.27	3.27	24	0.000	0.003
1600.0	1582.8	3.069	34.565	27.532	65.20	20.305	1488.60	2.95	22	0.012	0.009
1700.0	1681.3	2.796	34.590	27.577	60.64	20.937	1489.15	2.67	20	0.000	0.001
1800.0	1779.8	2.594	34.599	27.601	58.07	21.531	1489.94	2.47	19	0.009	0.005
1900.0	1878.2	2.451	34.616	27.627	55.61	22.103	1491.04	2.32	66	0.003	0.002
2000.0	1976.6	2.295	34.621	27.674	53.75	22.650	1492.03	2.15	19	0.005	0.000
2060.0	2035.6	2.237	34.631	27.647	52.61	22.969	1492.67	2.09	11	0.003	0.003

SHIP : HMAS COOK - Plessey
STATION NUMBER : 11 (THROUGH THE CRUISE)
STATION NUMBER : 11 (THROUGH THE YEAR)
DATE : 08-FEB-1986 (DAY NUMBER 39)
START TIME : 1105 GMT - Z
CRUISE : CK01/86
POSITION : 31:40.00S 173:33.00E
CAST DEPTH : 1986 METRES
BOTTOM DEPTH : 3130 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	22.996	35.779	24.528	340.14	0.340	1530.63	22.99	17	0.022	0.033
20.0	19.9	22.843	35.759	24.556	337.77	0.679	1530.30	22.84	20	0.056	0.095
30.0	29.8	22.105	35.627	24.667	327.62	1.012	1528.27	22.10	19	0.279	0.310
40.0	39.7	21.496	35.634	24.842	311.29	1.331	1526.93	21.49	20	0.118	0.132
50.0	49.6	21.233	35.647	24.924	303.82	1.639	1526.44	21.22	18	0.046	0.048
60.0	59.6	20.790	35.550	24.971	299.68	1.940	1525.33	20.78	19	0.308	0.386
70.0	69.5	19.977	35.568	25.203	277.95	2.229	1523.12	19.96	21	0.149	0.152
80.0	79.4	19.408	35.588	25.367	262.63	2.499	1521.77	19.39	19	0.176	0.171
90.0	89.4	18.871	35.585	25.502	250.07	2.756	1520.41	18.86	18	0.185	0.187
100.0	99.3	18.455	35.594	25.615	239.67	3.001	1519.46	18.44	18	0.101	0.104
120.0	119.1	17.851	35.580	25.754	227.02	3.464	1518.07	17.83	19	0.118	0.139
140.0	139.0	17.361	35.579	25.873	216.27	3.905	1516.98	17.34	18	0.034	0.040
160.0	158.8	16.984	35.549	25.941	210.43	4.332	1516.16	16.96	16	0.079	0.070
180.0	178.7	16.678	35.545	26.010	204.39	4.747	1515.55	16.65	19	0.035	0.032
200.0	198.5	16.517	35.527	26.034	202.70	5.153	1515.34	16.48	19	0.041	0.057
220.0	218.4	16.320	35.514	26.070	199.85	5.555	1515.09	16.28	22	0.034	0.042
240.0	238.2	16.242	35.511	26.086	198.97	5.952	1515.17	16.20	20	0.012	0.025
260.0	258.0	15.768	35.419	26.124	195.78	6.349	1513.89	15.73	21	0.084	0.097
280.0	277.9	15.057	35.329	26.214	187.59	6.732	1511.88	15.01	15	0.081	0.110
300.0	297.7	14.566	35.292	26.293	180.43	7.100	1510.66	14.52	19	0.038	0.042
320.0	317.5	14.178	35.237	26.333	176.98	7.458	1509.68	14.13	19	0.069	0.077
340.0	337.4	13.747	35.197	26.393	171.65	7.807	1508.55	13.70	18	0.043	0.032
360.0	357.2	13.302	35.157	26.454	166.17	8.148	1507.43	13.25	20	0.014	0.010
380.0	377.0	13.184	35.143	26.467	165.40	8.480	1507.35	13.13	18	0.011	0.013
400.0	396.8	12.835	35.059	26.472	165.20	8.810	1506.31	12.78	20	0.141	0.147
420.0	416.7	12.271	34.996	26.535	159.37	9.133	1504.68	12.21	19	0.102	0.121
440.0	436.5	11.752	34.967	26.611	152.26	9.445	1503.27	11.69	19	0.027	0.019
460.0	456.3	11.550	34.915	26.609	152.76	9.749	1502.79	11.49	19	0.090	0.114
480.0	476.1	11.050	34.874	26.669	147.17	10.050	1501.41	10.99	15	0.010	0.009
500.0	495.9	10.915	34.851	26.675	146.90	10.344	1501.24	10.85	16	0.031	0.039
550.0	545.5	10.488	34.801	26.713	144.02	11.071	1500.46	10.42	19	0.021	0.027
600.0	595.0	9.819	34.720	26.765	139.45	11.780	1498.83	9.75	21	0.057	0.056
700.0	694.0	8.256	34.579	26.905	126.16	13.112	1494.57	8.18	20	0.014	0.014
800.0	792.9	6.952	34.464	27.004	116.43	14.328	1491.09	6.88	21	0.032	0.020
900.0	891.8	6.171	34.423	27.075	109.66	15.459	1489.61	6.09	23	0.023	0.020
1000.0	990.7	5.555	34.405	27.138	103.78	16.524	1488.78	5.47	17	0.014	0.017
1100.0	1089.5	5.039	34.421	27.212	96.75	17.518	1488.32	4.95	19	0.024	0.018
1200.0	1188.2	4.473	34.467	27.312	87.02	18.439	1487.73	4.38	18	0.010	0.007
1300.0	1287.0	3.984	34.486	27.379	80.28	19.273	1487.38	3.88	22	0.014	0.010
1400.0	1385.6	3.701	34.520	27.435	75.02	20.047	1487.91	3.59	23	0.005	0.001
1500.0	1484.2	3.414	34.531	27.472	71.33	20.779	1488.32	3.30	18	0.021	0.019
1600.0	1582.8	3.123	34.556	27.519	66.56	21.464	1488.73	3.00	18	0.016	0.010
1700.0	1681.4	2.884	34.578	27.558	62.66	22.111	1489.47	2.76	18	0.008	0.009
1800.0	1779.8	2.729	34.588	27.581	60.55	22.724	1490.48	2.60	21	0.005	0.002
1900.0	1878.3	2.582	34.597	27.601	58.60	23.318	1491.55	2.45	20	0.002	0.001
2000.0	1976.7	2.426	34.610	27.624	56.22	23.891	1492.57	2.28	19	0.004	0.003
2020.0	1996.3	2.401	34.610	27.626	56.02	24.004	1492.75	2.26	25	0.001	0.001



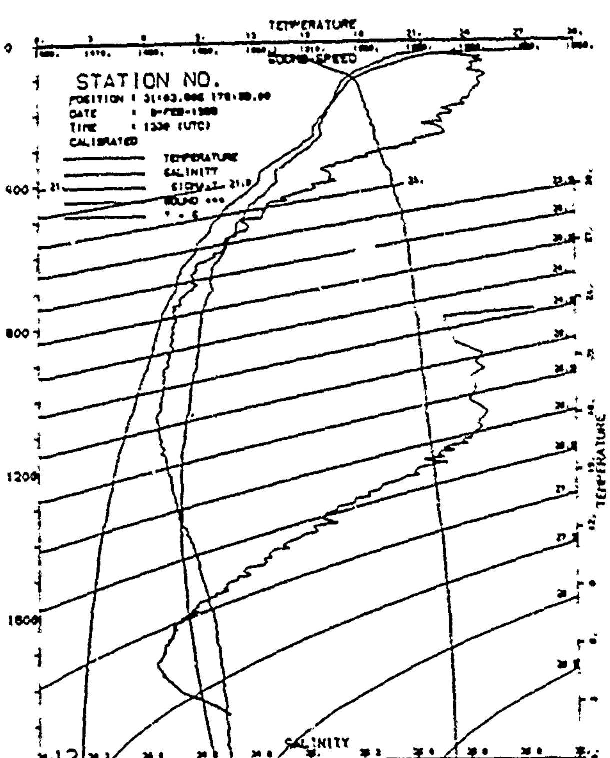


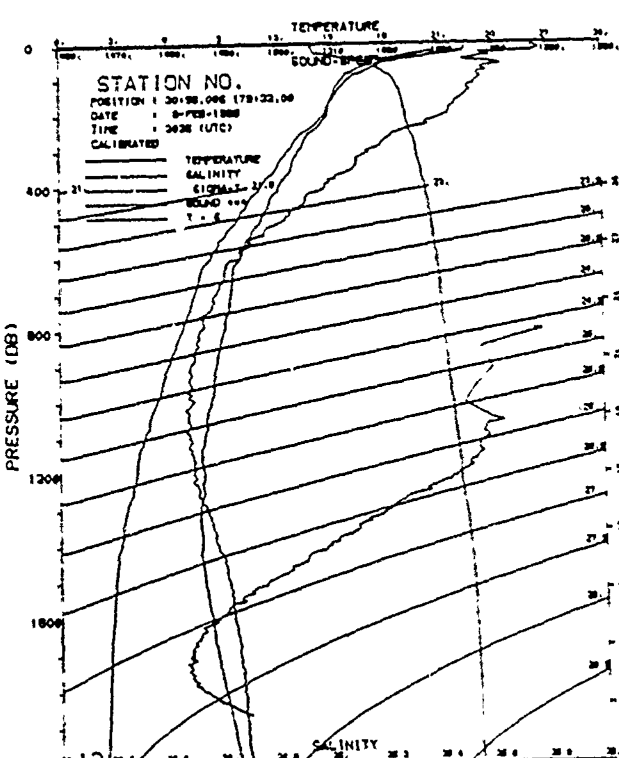
SHIP : HMAS COOK - Plessey
STATION NUMBER : 12 (THROUGH THE CRUISE)
STATION NUMBER : 12 (THROUGH THE YEAR)
DATE : 09-FEB-1986 (DAY NUMBER 40)
START TIME : 1230 GMT = Z
CRUISE : CK01/86
POSITION : 31:01.80S 178:59.00E
CAST DEPTH : 1749 METRES
BOTTOM DEPTH : 3010 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	23.418	35.773	24.400	352.31	0.352	1531.68	23.42	27	0.000	0.006
20.0	19 9	23.418	35.783	24.408	351.95	0.704	1531 86	23.41	23	0.000	0.009
30.0	29.8	23.424	35.786	24.408	352.29	1.056	1532.03	23.42	17	0.004	0.022
40.0	39.7	22.177	35.430	24.497	344.20	1.405	1527.94	22.17	19	0.700	0.619
50.0	49.6	20.961	35.580	24.948	301.54	1.727	1525.47	20.95	19	0.206	0.247
60.0	59.6	20.315	35.585	25.126	284.95	2.021	1523.94	20.30	21	0.161	0.196
70.0	69.5	19.643	35.567	25.289	269.70	2.298	1522.20	19.63	18	0.198	0.198
80.0	79.4	18.951	35.550	25.455	254.21	2.560	1520.36	18.94	19	0.229	0.254
90.0	89.4	18.314	35.593	25.649	236.03	2.805	1518.82	18.30	19	0.137	0.130
100.0	99.3	17.890	35.600	25.760	225.78	3.036	1517.78	17.87	17	0.112	0.116
120.0	119.1	17.260	35.591	25.907	212.45	3.474	1516.34	17.24	19	0.036	0.036
140.0	139.0	16.977	35.561	25.952	208.77	3.895	1515.76	16.95	17	0.052	0.058
160.0	158.8	16.699	35.548	26.007	204.06	4.307	1515.28	16.67	18	0.032	0.032
180.0	178.7	16.391	35.529	26.065	199.16	4.712	1514.64	16.36	19	0.025	0.041
200.0	198.5	16.042	35.485	26.112	195.16	5.110	1513.86	16.01	18	0.005	0.006
220.0	218.4	15.704	35.441	26.155	191.58	5.500	1513.10	15.67	17	0.021	0.012
240.0	238.2	15.409	35.414	26.201	187.73	5.881	1512.49	15.37	17	0.029	0.031
260.0	258.0	15.411	35.456	26.233	185.33	6.254	1512.88	15.37	18	0.007	0.012
280.0	277.9	14.950	35.324	26.234	185.64	6.625	1511.47	14.91	18	0.127	0.121
300.0	297.7	14.489	35.269	26.292	180.53	6.989	1510.29	14.44	18	0.089	0.116
320.0	317.5	13.766	35.163	26.363	173.95	7.343	1508.17	13.72	19	0.088	0.065
340.0	337.4	13.209	35.074	26.409	169.83	7.688	1506.55	13.16	17	0.098	0.131
360.0	357.2	12.527	34.981	26.473	163.89	8.022	1504.48	12.48	19	0.126	0.088
380.0	377.0	12.369	35.021	26.535	158.46	8.342	1504.46	.2.32	18	0.007	0.012
400.0	396.9	12.153	34.964	26.533	158.99	8.657	1503.92	12.10	19	0.101	0.124
420.0	416.7	11.701	34.918	26.583	154.41	8.968	1502.66	11.65	19	0.066	0.059
440.0	436.5	11.101	34.843	26.635	149.44	9.273	1500.82	11.05	18	0.085	0.061
460.0	456.3	10.600	34.789	26.683	144.96	9.568	1499.24	10.54	17	0.048	0.043
480.0	476.1	10.252	34.770	26.730	140.70	9.855	1498.45	10.20	19	0.044	0.042
500.0	496.0	9.912	34.689	26.725	141.26	10.135	1497.44	9.85	16	0.101	0.100
550.0	545.5	9.201	34.629	26.795	134.89	10.818	1495.60	9.14	19	0.069	0.076
600.0	595.0	8.564	34.579	26.858	129.20	11.473	1494.06	8.50	19	0.039	0.034
700.0	694.0	7.575	34.473	26.922	123.49	12.728	1491.84	7.51	20	0.044	0.044
800 0	793.0	6.677	34.422	27.007	115.59	13.919	1489.96	6.60	19	0.024	0.021
900 0	891.9	6.099	34.408	27.072	109.01	15.045	1489.31	6.02	19	0.007	0.004
1000.0	990.7	5.379	34.377	27.137	103.46	16.111	1488.02	5.29	17	0.014	0.011
1100.0	1089.5	4.772	34.370	27.202	97.05	17.116	1487.18	4.68	18	0.011	0.011
1200.0	1188.3	4.215	34.402	27.288	88.51	18.041	1486.57	4.12	18	0.013	0.009
1300.0	1287.0	3.819	34.434	27.354	82.03	18.892	1486.57	3.72	21	0.015	0.012
1400.0	1385.7	3.305	34.490	27.442	73.29	19.672	1486.51	3.28	15	0.007	0.002
1500.0	1484.3	3.150	34.525	27.492	68.55	20.383	1487.19	3.04	17	0.015	0.010
1600.0	1582.9	2.892	34.561	27.545	63.35	21.041	1487.81	2.78	17	0.008	0.003
1700.0	1681.4	2.734	34.585	27.578	60.26	21.659	1488.82	2.61	20	0.008	0.006
1800.0	1779.9	2.575	34.597	27.602	57.97	22.246	1489.81	2.45	17	0.009	0.006
1900.0	1878.4	2.467	34.612	27.622	56.09	22.815	1491.05	2.33	20	0.005	0.003
2000.0	1976.8	2.388	34.623	27.638	54.78	23.370	1492.40	2.25	28	0.005	0.004
2020.0	1996.4	2.365	34.624	27.641	54.53	23.479	1492.63	2.22	44	0.006	0.003

SHIP : HMAS COOK - Plessey
STATION NUMBER : 13 (THROUGH THE CRUISE)
STATION NUMBER : 13 (THROUGH THE YEAR)
DATE : 09-FEB-1986 (DAY NUMBER 40)
START TIME : 2026 GMT = Z
CRUISE : CK01/86
POSITION : 30:56.00S 179:32.00W
CAST DEPTH : 1989 METRES
BOTTOM DEPTH : 2625 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	22.482	35.698	24.613	332.01	0.332	1529.23	22.48	15	0.019	0 015
20.0	19.9	22.422	35.714	24.643	329.54	0.663	1529.23	22.42	21	0.029	0.043
30.0	29.8	21.591	35.529	24.735	321.07	0.988	1526.65	21.59	20	0.575	0.661
40 0	39.7	19.941	35.503	25.162	280.74	1.289	1522.42	19.93	21	0.469	0 526
50.0	49.6	18.417	35.453	25.516	247.35	1.553	1518.28	18.41	19	0 450	0.441
60.0	59.6	17.745	35.564	25.768	223.71	1.788	1516.76	17.73	18	0.031	0.038
70.0	69.5	17.325	35.499	25.820	219.06	2.010	1515.51	17.31	15	0 191	0.190
80.0	79.4	16.848	35.504	25.938	208.12	2.223	1514.30	16 84	20	0.134	0.162
90.0	89.4	16.290	35.487	26.056	197.17	2.426	1512 76	16.28	18	0.123	0.105
100.0	99.3	16.059	35.480	26.105	192.83	2.621	1512.25	16.04	19	0.072	0.080
120.0	119.1	15.628	35.448	26.178	186.41	2.999	1511.21	15.61	19	0.076	0.077
140.0	139.0	15.330	35.439	26.238	181.23	3.366	1510 60	15.31	18	0.052	0.056
160.0	158.8	15.065	35.406	26.272	178.57	3.725	1510.07	15.04	21	0 052	0.059
180.0	178.7	14.830	35.378	26.302	176.26	4.079	1509.64	14.80	19	0.044	0 045
200.0	198.5	14.654	35.367	26.331	174.00	4.429	1509.40	14.62	21	0.016	0.022
220.0	218.4	14.301	35.298	26.354	172.28	4.776	1508.49	14.27	16	0 057	0.077
240.0	238.2	13.829	35.224	26.397	168.62	5.117	1507.22	13.79	20	0.100	0.113
260.0	258.0	13.244	35.153	26.463	162.65	5.449	1505.55	13.21	20	0 048	0 049
280.0	277.9	12.943	35.119	26.497	159.82	5.771	1504.86	12.90	18	0 042	0.041
300.0	297.7	12.640	35.065	26.516	158.37	6.089	1504.10	12.60	.8	0.065	0 052
320.0	317.6	12.369	35.034	26.544	156.05	6.403	1503.46	12.33	19	0 057	0 062
340.0	337.4	12.112	35.027	26.589	152.16	6.711	1502.93	12.07	19	0 036	0 035
360.0	357.2	11.891	34.994	26.606	150.96	7.013	1502.48	11.84	17	0.040	0 033
380.0	377.0	11.472	34.937	26.640	147.89	7.313	1501.28	11.42	18	0.058	0 075
400.0	396.9	11.131	34.906	26.679	144.43	7.605	1500.41	11.08	19	0 041	0 038
420.0	416.7	10.851	34.849	26.685	144.14	7.893	1499.66	10.80	17	0 078	0 070
440.0	436.5	10.509	34.835	26.735	139.56	8.176	1498.78	10.46	18	0.029	0 026
460.0	456.3	10.327	34.812	26.749	138.51	8.454	1498.45	10.27	18	0.028	0.038
480.0	476.1	9.987	34.775	26.779	135.87	8.729	1492.53	9.93	18	0.031	0 037
500.0	496.0	9.773	34.745	26.791	134.85	9.000	1497.05	9.72	19	0 043	0 046
550.0	545.5	8.933	34 629	26.839	130.51	9.663	1494.66	8.87	19	0.076	0 076
600.0	595.0	8.395	34.591	26.893	125.64	10.302	1493.45	8.33	20	0.017	0 027
700.0	694.0	7.496	34.501	26.956	120.26	11.525	1491.58	7.43	19	0 015	0.016
800.0	793.0	6.781	34.444	27.011	115.41	12.705	1490.36	6.70	17	0.024	0.027
900.0	891.9	5.985	34.406	27.085	108.36	13.820	1488.80	5.90	21	0 032	0.026
1000.0	990.7	5.338	34.415	27.172	100.14	14.869	1487.86	5.25	102	0.011	0.015
1100.0	1089.5	4.648	34.398	27.238	93.36	15.842	1486 68	4.56	20	0 026	0 021
1200.0	1188.3	4.226	34.413	27.295	87.83	16.737	1486.62	4.13	18	0.017	0 012
1300.0	1287.0	3.645	34.457	27.390	78.19	17.572	1485.87	3 55	18	0.034	0.026
1400.0	1385.7	3.303	34.497	27.455	71.29	18.319	1486.11	3.20	16	0 014	0 013
1500.0	1484.3	3.009	34.537	27.515	65.93	19.002	1486 62	2.90	20	0.003	0 000
1600.0	1582.9	2.880	34.550	27.537	64.02	19.651	1487.73	2.77	19	0.008	0 005
1700.0	1681.5	2.734	34.572	27.567	61.23	20.273	1488.79	2.61	19	0 004	0 002
1800.0	1779.9	2.640	34.585	27.586	59.71	20.876	1490.08	2.51	19	0 004	0 000
1900.0	1878.4	2.582	34.596	27.600	58.69	21.468	1491.51	2.45	19	0 006	0 002
2000.0	1976.8	2.477	34.610	27.621	56.82	22.047	1492.76	2.33	21	0 005	0 002
2020.0	1996.5	2.472	34.614	27.623	56.64	22.161	1493.01	2.33	31	0.000	0 005



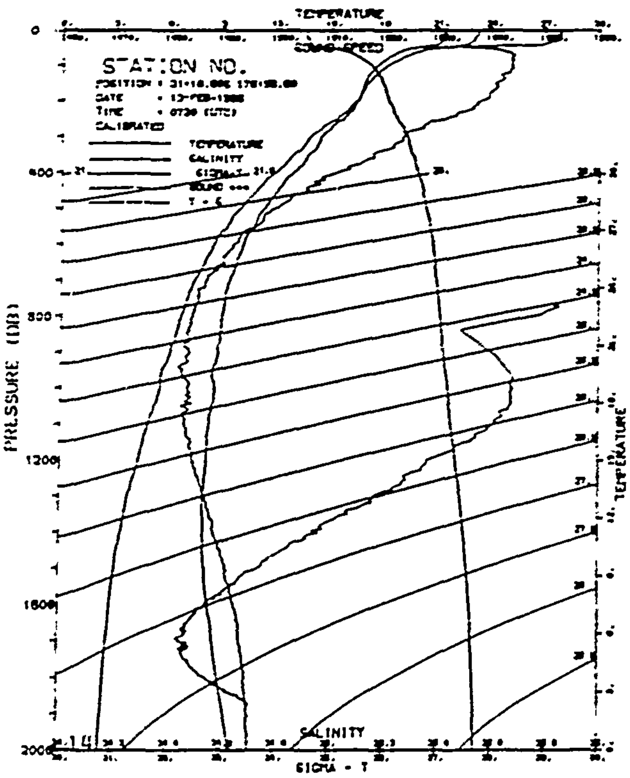


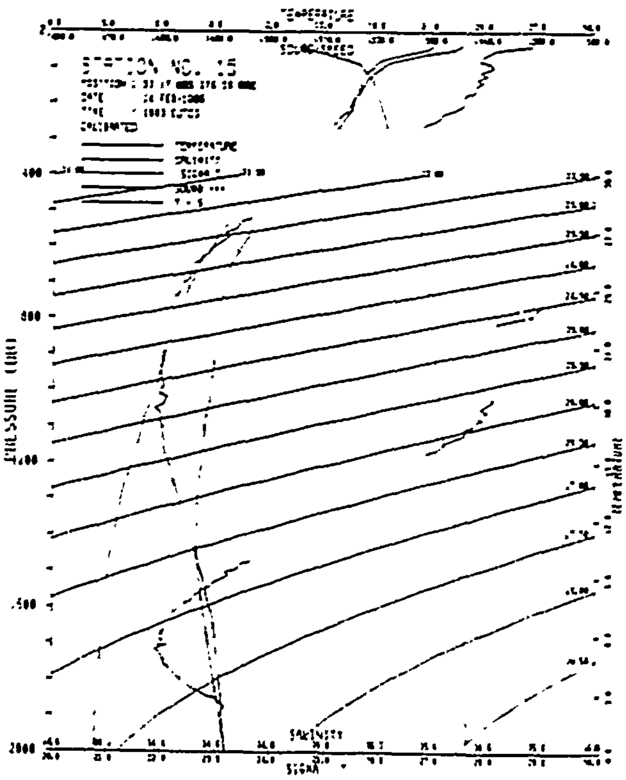
SHIP : HMAS COOK - Primary
STATION NUMBER : 14 (THROUGH THE CRUISE)
STATION NUMBER : 14 (THROUGH THE YEAR)
DATE : 13-FEB-1986 CAST NUMBER 661
START TIME : 0720 GMT + 2
CRUISE : C001.86
POSITION : [illegible]
CAST DEPTH : 1992 METRES
BOTTOM DEPTH : 4510 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	21.222	35.902	24.482	344.65	0.344	1531.27	21.23	28	0.096	0.212
20.0	19.9	21.056	35.288	24.526	341.58	0.687	1530.90	21.05	23	0.263	0.056
30.0	29.8	22.942	35.282	24.546	339.38	1.028	1530.78	22.91	22	0.055	0.088
40.0	39.7	22.645	35.336	24.546	334.76	1.365	1530.08	22.64	28	0.257	0.244
50.0	49.6	22.408	35.400	24.743	321.39	1.693	1526.26	21.39	30	0.736	0.786
60.0	59.6	20.788	35.586	25.223	275.46	1.991	1522.99	20.97	30	0.124	0.239
70.0	69.5	19.381	35.621	25.400	250.13	2.250	1521.40	19.37	19	0.241	0.130
80.0	79.4	18.920	35.620	25.525	248.54	2.502	1520.48	18.91	19	0.114	0.095
90.0	89.4	18.543	35.614	25.600	240.00	2.756	1519.55	18.53	20	0.121	0.128
100.0	99.3	18.176	35.617	25.702	231.36	2.992	1518.40	18.16	19	0.097	0.096
120.0	119.1	17.482	35.609	25.878	220.98	3.446	1517.50	17.46	20	0.047	0.053
140.0	139.0	17.267	35.503	25.898	221.06	3.879	1516.60	17.24	20	0.038	0.042
160.0	158.8	16.946	35.559	25.957	208.05	4.305	1516.04	16.92	20	0.030	0.032
180.0	178.7	16.720	35.512	25.991	206.87	4.730	1515.61	16.50	22	0.039	0.044
200.0	198.5	16.416	35.496	26.029	201.28	5.127	1515.02	16.40	19	0.083	0.099
220.0	218.4	16.044	35.467	26.097	197.20	5.527	1514.17	16.02	21	0.048	0.034
240.0	238.2	15.593	35.400	26.149	192.75	5.918	1512.98	15.56	18	0.054	0.075
260.0	258.0	14.953	35.302	26.226	186.76	6.298	1511.16	14.92	21	0.117	0.159
280.0	277.9	14.424	35.259	26.298	179.34	6.663	1509.81	14.38	20	0.063	0.084
300.0	297.7	13.871	35.201	26.372	172.54	7.015	1508.31	13.83	20	0.062	0.063
320.0	317.5	13.617	35.173	26.402	170.23	7.357	1507.77	13.57	17	0.058	0.064
340.0	337.4	13.245	35.122	26.410	167.15	7.694	1506.78	13.20	19	0.088	0.122
360.0	357.2	12.787	35.009	26.506	160.98	8.021	1505.57	12.74	18	0.035	0.235
380.0	377.0	12.441	35.022	26.521	159.78	8.342	1504.65	12.39	19	0.068	0.092
400.0	396.9	11.976	34.959	26.563	156.04	8.657	1503.32	11.92	21	0.009	0.092
420.0	416.7	11.428	34.897	26.617	150.94	8.965	1501.73	11.37	22	0.052	0.057
440.0	436.5	11.092	34.846	26.639	149.97	9.261	1500.79	11.04	20	0.039	0.080
460.0	456.3	10.773	34.822	26.677	145.66	9.557	1499.99	10.72	20	0.509	0.558
480.0	476.1	10.361	34.774	26.711	142.25	9.845	1498.86	10.30	20	0.041	0.042
500.0	495.9	10.034	34.720	26.734	140.40	10.128	1497.96	9.97	22	0.069	0.082
550.0	545.5	9.287	34.650	26.804	134.14	10.812	1495.96	9.23	18	0.028	0.031
600.0	595.0	8.511	34.560	26.854	129.55	11.470	1493.94	8.47	19	0.037	0.041
700.0	694.0	7.471	34.467	26.911	122.34	12.728	1491.44	7.40	18	0.033	0.031
800.0	792.9	6.707	34.412	26.996	116.71	13.923	1490.04	6.63	19	0.021	0.026
900.0	891.8	6.110	34.399	27.064	113.61	15.064	1489.32	6.03	18	0.013	0.012
1000.0	990.7	5.521	34.394	27.133	104.15	16.136	1488.62	5.44	20	0.017	0.014
1100.0	1089.5	4.986	34.383	27.198	97.72	17.147	1487.70	4.90	22	0.023	0.029
1200.0	1188.3	4.375	34.419	27.277	89.96	18.080	1487.23	4.29	20	0.019	0.012
1300.0	1287.0	3.922	34.456	27.372	80.42	18.932	1486.56	3.72	21	0.009	0.004
1400.0	1385.7	3.436	34.490	27.437	73.91	19.703	1486.69	3.33	21	0.010	0.016
1500.0	1484.3	3.116	34.537	27.505	67.26	20.406	1487.06	3.01	19	0.012	0.008
1600.0	1582.9	2.863	34.560	27.553	62.53	21.054	1487.60	2.75	18	0.005	0.003
1700.0	1681.4	2.708	34.589	27.584	59.62	21.663	1488.72	2.59	21	0.006	0.004
1800.0	1779.9	2.544	34.610	27.614	56.65	22.243	1489.73	2.42	16	0.002	0.004
1900.0	1878.3	2.408	34.618	27.632	54.93	22.802	1490.81	2.27	18	0.005	0.003
2000.0	1976.7	2.299	34.628	27.650	53.19	23.344	1491.97	2.15	19	0.006	0.002
2030.0	2006.2	2.260	34.632	27.656	52.67	23.503	1492.31	2.12	61	0.001	0.000

SHIP : HMAS COOK - Primary
STATION NUMBER : 15 (THROUGH THE CRUISE)
STATION NUMBER : 15 (THROUGH THE YEAR)
DATE : 14-FEB-1986 CAST NUMBER 654
START TIME : 1818 GMT + 2
CRUISE : C001.86
POSITION : [illegible]
CAST DEPTH : 1989 METRES
BOTTOM DEPTH : 4646 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
0.0	0.0	23.094	35.802	24.524	340.22	0.000	1530.92	23.09	6	0.000	0.002
10.0	9.9	23.099	35.805	24.522	340.36	0.340	1530.92	23.08	13	0.085	0.088
20.0	19.9	23.046	35.802	24.530	340.20	0.680	1530.84	23.04	20	0.211	0.055
30.0	29.8	22.870	35.794	24.567	337.14	1.019	1530.42	22.86	19	0.250	0.041
40.0	39.7	22.671	35.772	24.606	332.90	1.354	1530.27	22.66	19	0.065	0.049
50.0	49.6	22.256	35.641	24.636	331.36	1.686	1529.00	22.25	17	0.438	0.437
60.0	59.6	20.888	35.633	25.024	295.60	2.090	1525.39	20.88	22	0.254	0.225
70.0	69.5	19.884	35.509	25.264	272.22	2.294	1522.74	19.73	19	0.278	0.242
80.0	79.4	18.947	35.502	25.408	258.37	2.545	1520.56	18.93	17	0.231	0.149
90.0	89.4	18.422	35.523	25.645	235.62	2.790	1519.29	18.42	12	0.127	0.090
100.0	99.3	18.224	35.629	25.699	231.42	3.024	1519.39	18.22	19	0.367	0.384
120.0	119.1	17.488	35.646	25.911	221.65	3.476	1517.45	17.69	18	0.028	0.032
140.0	139.0	17.273	35.589	25.902	221.52	3.920	1516.75	17.25	19	0.062	0.026
160.0	158.8	17.058	35.560	25.938	220.75	4.336	1516.19	17.03	17	0.025	0.029
180.0	178.7	16.756	35.522	25.974	207.89	4.754	1515.76	16.73	22	0.095	0.113
200.0	198.5	16.475	35.523	26.041	202.30	5.162	1515.24	16.44	22	0.209	0.224
220.0	218.4	16.246	35.482	26.062	200.58	5.565	1514.52	16.21	20	0.045	0.089
240.0	238.2	15.794	35.433	26.129	196.72	5.961	1513.72	15.76	19	0.045	0.041
260.0	258.0	15.477	35.376	26.155	192.75	6.348	1512.96	15.44	19	0.047	0.042
280.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
300.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
320.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
340.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
360.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
380.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
400.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
420.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
440.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
460.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
480.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
500.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
550.0	545.5	9.460	34.675	26.799	135.77	11.052	1496.61	9.45	21	0.012	0.010
600.0	595.0	8.785	34.597	26.837	131.41	11.729	1494.64	8.72	19	0.052	0.047
700.0	694.0	7.666	34.483	26.917	124.14	12.999	1492.16	7.59	20	0.036	0.020
800.0	0.0	0.000	0.000	0.000	0.00	0.000	0.0	0.00	0	0.000	0.000
900.0	891.8	6.235	34.403	27.054	111.68	15.315	1489.56	5.12	20	0.014	0.015
1000.0	990.7	5.636	34.399	27.124	105.28	16.413	1489.04	5.55	17	0.041	0.049
1100.0	1089.5	4.970	34.497	27.290	95.92	17.411	1490.00	4.59	24	0.012	0.011
1200.0	1188.3	4.415	34.428	27.297	89.13	18.366	1487.33	4.12	19	0.012	0.014
1300.0	1287.0	3.846	34.467	27.378	79.95	19.208	1486.73	3.75	21	0.018	0.013
1400.0	1385.7	3.416	34.505	27.451	72.56	19.971	1486.50	3.31	19	0.010	0.007
1500.0	1484.3	3.080	34.547	27.516	66.07	20.661	1486.99	2.97	22	0.004	0.008
1600.0	1582.9	2.872	34.578	27.560	61.06	21.301	1487.72	2.76	15	0.002	0.006
1700.0	1681.4	2.714	34.594	27.594	58.95	21.901	1488.73	2.59	20	0.009	0.005
1800.0	1779.9	2.564	34.615	27.617	56.49	22.476	1489.79	2.44	21	0.001	0.002
1900.0	1878.3	2.419	34.624	27.636	54.60	23.030	1490.95	2.29	19	0.004	0.001
2000.0	1976.7	2.300	34.635	27.656	52.75	23.565	1492.01	2.15	17	0.009	0.002
2020.0	1996.4	2.280	34.636	27.657	52.50	23.670	1492.22	2.14	26	0.009	0.001



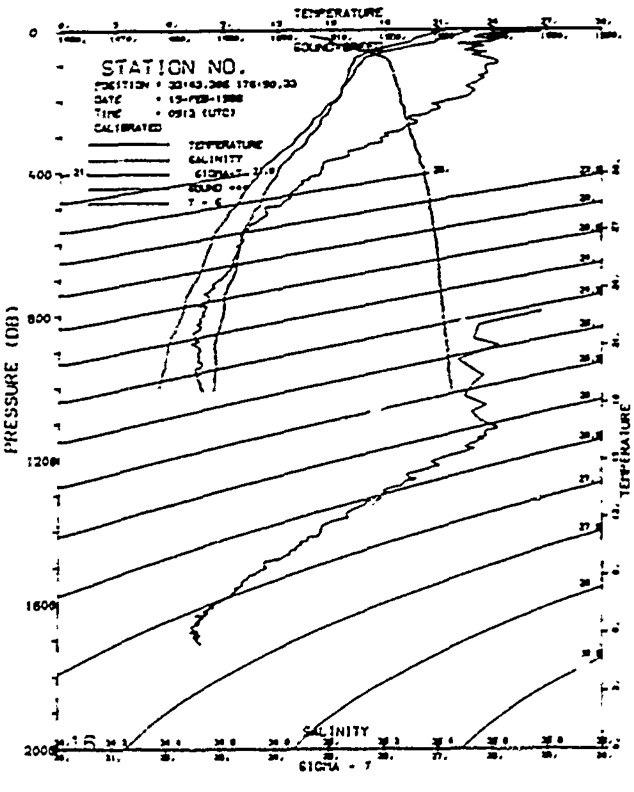


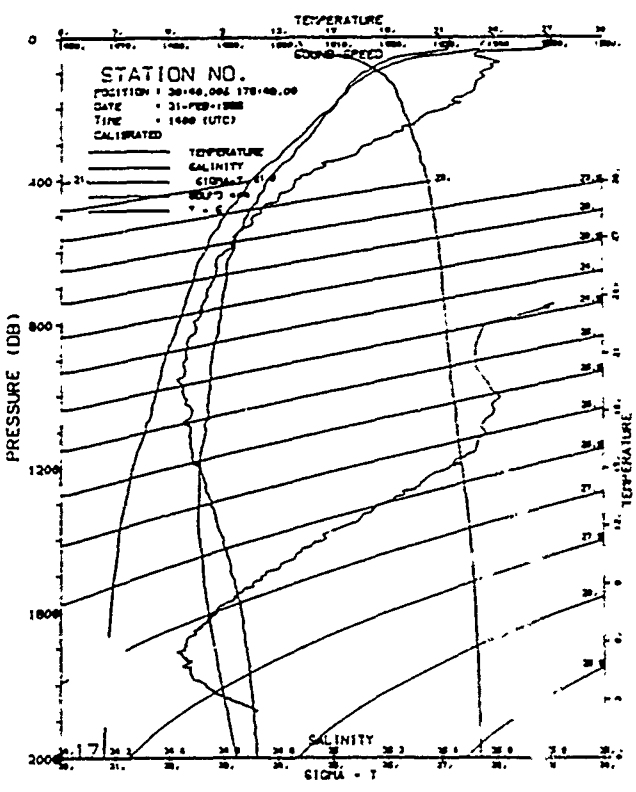
SHIP : HMAS COOK - ?
STATION NUMBER : 15 (THROUGH THE CRUISE)
STATION NUMBER : 15 (THROUGH THE YEAR)
DATE : 15-FEB-1986 (DAY NUMBER 46)
START TIME : 0512 GMT - Z
CRUISE : COOL96
POSITION : 33:43.30S 176:50.33E
CAST DEPTH : 1000 METRES
BOTTOM DEPTH : METRES

PRES	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	22.304	35.572	24.565	316.57	0.326	1528.59	22.32	20	0.023	0.049
20.0	19.9	22.259	35.665	24.540	319.88	0.639	1526.95	22.26	20	0.354	0.399
30.0	29.8	20.909	35.542	24.922	301.12	0.986	1525.10	20.94	19	0.085	0.067
40.0	39.7	20.376	35.429	24.991	297.00	1.286	1523.41	20.37	19	0.354	0.412
50.0	49.6	19.195	35.470	25.338	264.90	1.567	1520.43	19.19	18	0.259	0.274
60.0	59.6	18.276	35.440	25.542	265.24	1.822	1517.09	18.27	18	0.288	0.279
70.0	69.5	17.576	35.465	25.733	227.32	2.059	1516.22	17.56	18	0.297	0.247
80.0	79.4	16.922	35.480	25.900	220.36	2.270	1514.46	16.91	19	0.127	0.116
90.0	89.3	16.696	35.539	26.008	202.44	2.485	1514.20	16.68	17	0.065	0.052
100.0	99.1	16.522	35.585	26.080	200.94	2.686	1513.80	16.51	20	0.071	0.080
120.0	119.1	16.252	35.502	26.076	196.17	3.083	1513.24	16.23	17	0.022	0.022
140.0	139.0	16.026	35.482	26.116	193.82	3.474	1512.80	15.99	19	0.032	0.041
160.0	158.8	15.609	35.424	26.146	190.68	3.858	1512.04	15.66	19	0.049	0.073
180.0	178.7	15.504	35.438	26.199	186.16	4.233	1511.83	15.47	20	0.027	0.034
200.0	198.5	15.207	35.367	26.215	185.20	4.604	1511.55	15.16	19	0.068	0.086
220.0	218.3	14.704	35.323	26.287	178.82	4.970	1509.87	14.67	17	0.028	0.034
240.0	238.2	14.426	35.251	26.296	178.40	5.327	1509.17	14.39	18	0.047	0.062
260.0	258.0	13.984	35.238	26.375	171.20	5.678	1508.12	13.95	19	0.060	0.087
280.0	277.8	13.693	35.202	26.393	169.99	6.021	1507.39	13.65	22	0.061	0.063
300.0	297.7	13.227	35.127	26.439	166.01	6.359	1506.10	13.19	15	0.049	0.050
320.0	317.5	12.987	35.084	26.477	162.60	6.687	1505.35	12.86	19	0.045	0.039
340.0	337.3	12.334	34.995	26.521	158.76	7.009	1503.59	12.29	20	0.120	0.129
360.0	357.2	11.886	34.955	26.577	153.20	7.321	1502.41	11.84	20	0.059	0.060
380.0	377.0	11.356	34.881	26.610	149.90	7.626	1500.01	11.31	18	0.079	0.086
400.0	396.8	11.062	34.871	26.664	145.79	7.921	1500.13	11.01	17	0.034	0.026
420.0	416.5	10.780	34.824	26.679	144.57	8.211	1499.42	10.73	15	0.062	0.042
440.0	436.4	10.438	34.792	26.714	141.40	8.497	1498.49	10.38	17	0.050	0.051
460.0	456.3	10.139	34.759	26.740	139.21	8.777	1497.72	10.08	18	0.048	0.046
480.0	476.1	9.951	34.742	26.759	137.60	9.053	1497.36	9.90	16	0.041	0.047
500.0	495.9	9.632	34.669	26.756	138.07	9.328	1496.41	9.58	10	0.101	0.103
550.0	545.4	8.878	34.604	26.828	131.49	9.995	1494.39	8.82	18	0.050	0.046
600.0	594.9	8.379	34.575	26.883	126.62	10.636	1493.38	8.31	17	0.019	0.019
700.0	693.9	7.548	34.489	26.939	122.92	11.875	1491.74	7.48	19	0.042	0.044
800.0	792.8	6.717	34.432	27.020	115.41	13.055	1490.13	6.64	18	0.014	0.018
900.0	891.7	5.979	34.413	27.093	107.56	14.179	1488.82	5.89	20	0.013	0.012
1000.0	990.6	5.497	34.421	27.150	101.81	15.223	1488.56	5.41	25	0.016	0.013
1010.0	1000.5	5.425	34.427	27.171	100.47	15.324	1488.41	5.34	30	0.017	0.005

SHIP : HMAS COOK - ?
STATION NUMBER : 17 (THROUGH THE CRUISE)
STATION NUMBER : 17 (THROUGH THE YEAR)
DATE : 21-FEB-1986 (DAY NUMBER 52)
START TIME : 1400 GMT - Z
CRUISE : COOL96
POSITION : 30:40.00S 176:49.00E
CAST DEPTH : 2000 METRES
BOTTOM DEPTH : 4545 METRES

PRES	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	23.582	35.245	24.354	356.45	0.356	1531.91	23.50	20	0.065	0.055
20.0	19.9	23.373	35.238	24.372	355.40	0.712	1531.60	23.37	29	0.251	0.641
30.0	29.8	23.304	35.233	24.403	352.27	1.067	1531.60	23.30	28	0.029	0.031
40.0	39.7	22.771	35.565	24.630	350.55	1.419	1529.79	22.76	29	0.564	0.619
50.0	49.7	22.045	35.449	24.833	312.47	1.750	1525.25	22.03	20	0.592	0.616
60.0	59.6	19.539	35.563	25.268	271.39	2.042	1521.62	19.53	28	0.303	0.399
70.0	69.5	18.880	35.538	25.400	254.53	2.303	1519.06	18.79	27	0.143	0.130
80.0	79.4	18.243	35.536	25.498	239.61	2.549	1518.41	18.23	20	0.142	0.130
90.0	89.4	17.362	35.514	25.725	228.33	2.783	1517.22	17.35	19	0.109	0.152
100.0	99.3	17.263	35.465	25.880	222.13	3.008	1515.77	17.25	15	0.176	0.154
120.0	119.2	16.570	35.472	25.979	205.65	3.432	1514.26	16.55	23	0.094	0.099
140.0	139.0	16.088	35.450	26.091	195.37	3.832	1512.79	16.08	21	0.056	0.069
160.0	158.8	15.741	35.420	26.137	191.53	4.229	1512.22	15.72	19	0.053	0.066
180.0	178.7	15.260	35.367	26.198	186.22	4.597	1519.99	15.23	19	0.063	0.046
200.0	198.5	14.955	35.340	26.265	182.26	4.965	1510.31	14.92	22	0.055	0.031
220.0	218.4	14.432	35.250	26.295	177.89	5.327	1508.96	14.40	17	0.079	0.084
240.0	238.2	13.999	35.229	26.358	172.37	5.676	1507.79	13.95	20	0.056	0.058
260.0	258.1	13.627	35.182	26.386	168.16	6.018	1506.98	13.59	17	0.031	0.021
280.0	277.9	13.269	35.129	26.439	165.44	6.351	1505.98	13.23	19	0.036	0.052
300.0	297.7	12.723	35.049	26.487	161.19	6.680	1504.38	12.50	19	0.067	0.065
320.0	317.6	12.285	35.006	26.540	156.46	6.998	1503.20	12.24	18	0.060	0.064
340.0	337.4	11.909	34.958	26.559	154.94	7.309	1502.03	11.74	18	0.066	0.075
360.0	357.2	11.363	34.883	26.619	149.37	7.615	1500.49	11.32	19	0.047	0.049
380.0	377.0	10.982	34.834	26.650	146.59	7.911	1499.44	10.93	18	0.054	0.059
400.0	396.9	10.538	34.778	26.685	143.41	8.201	1498.16	10.49	20	0.061	0.064
420.0	416.7	10.280	34.767	26.722	140.17	8.484	1497.60	10.23	19	0.023	0.022
440.0	436.5	9.971	34.720	26.739	138.76	8.764	1496.72	9.92	20	0.054	0.044
460.0	456.3	9.749	34.738	26.767	136.30	9.039	1496.27	9.70	19	0.027	0.036
480.0	476.2	9.327	34.639	26.783	134.90	9.311	1494.35	9.27	19	0.066	0.066
500.0	496.0	9.079	34.624	26.811	132.31	9.577	1494.37	9.02	18	0.047	0.045
550.0	545.5	8.416	34.554	26.861	127.87	10.226	1492.54	8.36	20	0.046	0.048
600.0	595.0	7.938	34.507	26.896	124.82	10.854	1491.61	7.50	19	0.041	0.043
700.0	694.0	7.152	34.444	26.958	119.51	12.067	1490.21	7.09	19	0.030	0.029
800.0	793.0	6.441	34.395	27.018	114.21	13.235	1488.99	6.37	19	0.020	0.020
900.0	891.9	5.740	34.355	27.076	108.78	14.352	1487.79	5.56	19	0.028	0.029
1000.0	990.8	5.165	34.351	27.142	102.53	15.413	1487.14	5.08	17	0.019	0.018
1100.0	1089.6	4.621	34.374	27.222	94.82	16.397	1486.59	4.53	19	0.014	0.010
1200.0	1188.3	3.967	34.409	27.329	84.86	17.301	1485.57	3.87	19	0.011	0.007
1300.0	1287.1	3.529	34.447	27.394	77.48	18.113	1485.39	3.43	21	[illegible]	0.015
1400.0	1385.7	3.176	34.492	27.464	70.57	18.850	1485.55	3.07	19	0.005	0.004
1500.0	1484.4	2.920	34.524	27.512	65.84	19.533	1486.24	2.81	18	0.007	0.002
1600.0	1583.0	2.756	34.556	27.553	62.08	20.179	1487.23	2.64	18	0.008	0.005
1700.0	1681.5	2.626	34.573	27.578	59.82	20.780	1488.37	2.51	19	0.006	0.004
1800.0	1790.0	2.526	34.588	27.599	58.02	21.368	1489.61	2.40	18	0.005	0.004
1900.0	1879.4	2.431	34.599	27.615	56.56	21.939	1490.96	2.30	19	0.002	0.000
2000.0	1976.8	2.361	34.606	27.629	55.51	22.497	1492.25	2.22	20	0.000	0.003
2020.0	1996.5	2.351	34.613	27.633	55.10	22.608	1492.55	2.21	28	0.000	0.005



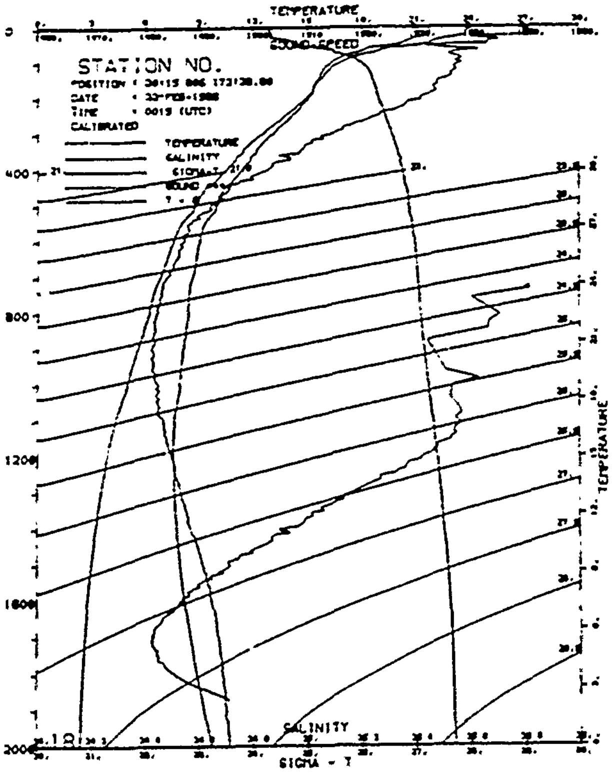


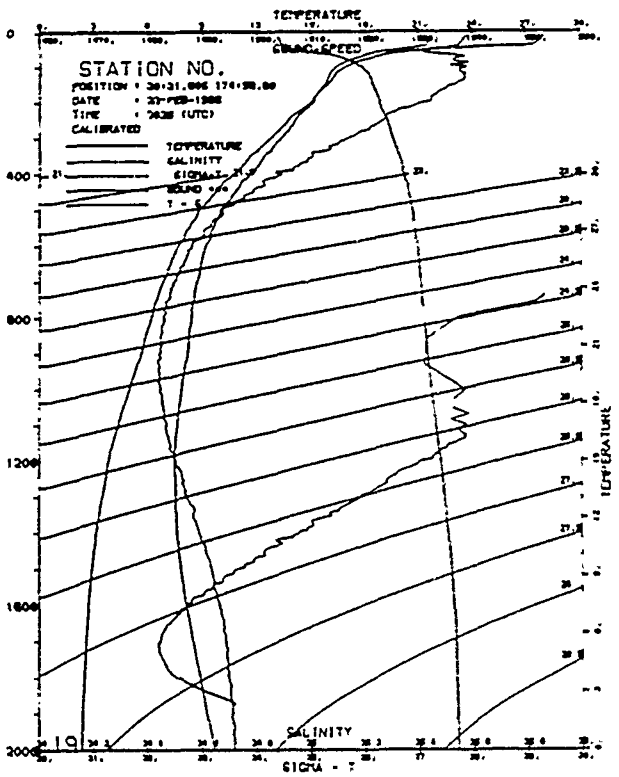
SHIP : HMAS COOK - Primary
STATION NUMBER : 18 (THROUGH THE CRUISE)
STATION NUMBER : 18 (THROUGH THE YEAR)
DATE : 23-FEB-1986 (DAY NUMBER 54)
START TIME : 0015 GMT - 0
CRUISE : C01/86
POSITION : 30:15.00S 172:20.00E
CAST DEPTH : 2000 METRES
BOTTOM DEPTH : 5361 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	23.952	35.736	24.265	367.11	0.367	1532.72	23.85	17	0.056	0.063
20.0	19.9	23.741	35.752	24.283	361.88	0.732	1532.70	23.76	25	0.088	0.085
30.0	29.8	23.293	35.509	24.336	360.08	1.094	1530.94	23.19	20	0.474	0.551
40.0	39.7	22.213	35.623	24.633	331.25	1.440	1528.77	22.20	23	0.285	0.249
50.0	49.7	21.544	35.565	24.764	319.79	1.765	1526.96	21.53	19	0.236	0.373
60.0	59.6	19.608	35.428	25.106	279.24	2.065	1521.55	19.60	19	0.505	0.399
70.0	69.5	18.837	35.409	25.410	256.40	2.332	1519.88	18.82	17	0.229	0.366
80.0	79.4	17.989	35.457	25.626	237.91	2.579	1517.45	17.98	16	0.263	0.254
90.0	89.4	17.295	35.491	25.822	219.52	2.807	1515.73	17.28	18	0.152	0.155
100.0	99.3	16.809	35.478	25.928	209.71	3.022	1514.44	16.79	17	0.113	0.098
120.0	119.1	16.191	35.469	26.065	197.22	3.428	1512.78	16.17	19	0.049	0.257
140.0	139.0	15.871	35.451	26.125	192.96	3.818	1512.32	15.85	15	0.029	0.033
160.0	158.8	15.491	35.399	26.171	188.27	4.199	1511.42	15.47	17	0.037	0.034
180.0	178.7	15.288	35.399	26.216	184.48	4.573	1511.13	15.26	17	0.018	0.022
200.0	198.5	14.916	35.319	26.251	181.53	4.940	1510.19	14.89	18	0.058	0.052
220.0	218.4	14.451	35.274	26.304	177.12	5.299	1508.94	14.42	19	0.076	0.074
240.0	238.2	13.993	35.199	26.343	173.77	5.650	1507.73	13.96	18	0.107	0.129
260.0	258.1	13.527	35.143	26.397	168.58	5.993	1506.47	13.49	18	0.056	0.054
280.0	277.9	12.981	35.055	26.440	165.23	6.327	1504.88	12.94	18	0.096	0.107
300.0	297.7	12.536	34.996	26.483	161.48	6.653	1503.69	12.50	18	0.082	0.101
320.0	317.6	11.973	34.931	26.541	156.12	6.969	1502.04	11.93	20	0.089	0.083
340.0	337.4	11.540	34.893	26.594	151.40	7.277	1500.85	11.50	19	0.055	0.046
360.0	357.2	11.173	34.823	26.607	150. 3	7.578	1499.88	11.13	19	0.124	0.122
380.0	377.1	10.855	34.786	26.635	147.94	7.873	1499.30	10.81	18	0.191	0.134
400.0	396.9	10.469	34.764	26.687	143.23	8.164	1497.92	10.42	19	0.045	0.049
420.0	416.7	10.064	34.700	26.707	141.41	8.449	1496.25	10.01	21	0.069	0.061
440.0	436.5	9.632	34.634	26.729	139.40	8.729	1495.43	9.58	17	0.093	0.107
460.0	456.4	9.234	34.610	26.776	135.04	9.003	1494.31	9.18	17	0.036	0.038
480.0	476.2	8.955	34.593	26.807	132.23	9.271	1493.50	8.90	15	0.013	0.005
500.0	496.0	8.755	34.544	26.800	133.00	9.537	1493.13	8.70	17	0.048	0.042
550.0	545.5	7.998	34.460	26.857	127.76	10.189	1491.02	7.94	17	0.040	0.047
600.0	595.0	7.527	34.443	26.906	123.40	10.814	1490.01	7.47	20	0.023	0.023
700.0	694.0	6.787	34.378	26.958	118.94	12.024	1488.60	6.72	15	0.030	0.028
800.0	793.0	6.170	34.340	27.009	114.52	13.187	1487.85	6.10	20	0.024	0.024
900.0	891.9	5.536	34.320	27.073	108.61	14.303	1486.93	5.46	21	0.029	0.024
1000.0	990.8	4.989	34.346	27.150	100.58	15.351	1486.41	4.91	23	0.008	0.004
1100.0	1089.6	4.346	34.363	27.243	92.15	16.321	1485.40	4.26	19	0.008	0.005
1200.0	1188.4	3.871	34.391	27.315	85.02	17.209	1485.10	3.70	21	0.010	0.012
1300.0	1287.1	3.527	34.426	27.377	79.03	18.031	1485.37	3.43	20	0.009	0.005
1400.0	1385.8	3.238	34.462	27.434	73.56	18.794	1485.85	3.14	19	0.009	0.006
1500.0	1484.4	2.974	34.504	27.492	67.93	19.499	1486.43	2.87	18	0.006	0.004
1600.0	1583.0	2.782	34.537	27.535	63.77	20.155	1487.29	2.67	19	0.006	0.005
1700.0	1681.5	2.645	34.562	27.567	60.95	20.777	1488.40	2.52	21	0.004	0.004
1800.0	1780.0	2.532	34.579	27.590	58.80	21.374	1489.62	2.40	19	0.002	0.001
1900.0	1878.5	2.443	34.594	27.610	57.10	21.953	1490.93	2.31	19	0.002	0.003
2000.0	1976.9	2.377	34.603	27.623	56.09	22.519	1492.33	2.23	18	0.004	0.004
2020.0	1996.6	2.356	34.608	27.629	55.55	22.631	1492.60	2.21	117	0.004	0.002

SHIP : HMAS COOK - Primary
STATION NUMBER : 19 (THROUGH THE CRUISE)
STATION NUMBER : 19 (THROUGH THE YEAR)
DATE : 23-FEB-1986 (DAY NUMBER 54)
START TIME : 2325 GMT - 0
CRUISE : C01/86
POSITION : 30:31.54S 173:58.00E
CAST DEPTH : 2061 METRES
BOTTOM DEPTH : 5150 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	23.679	35.790	24.340	357.25	0.357	1532.28	23.64	21	0.029	0.023
20.0	19.9	23.548	35.787	24.372	355.31	0.713	1532.26	23.54	18	0.029	0.028
30.0	29.8	23.429	35.776	24.399	353.15	1.068	1532.09	23.42	21	0.046	0.055
40.0	39.7	23.242	35.744	24.429	350.66	1.419	1531.54	23.23	19	0.083	0.116
50.0	49.7	22.282	35.428	24.556	342.73	1.766	1527.92	22.29	17	0.501	0.720
60.0	59.6	20.089	35.375	25.036	294.44	2.085	1522.68	20.08	21	0.561	0.499
70.0	69.5	18.873	35.462	25.408	258.37	2.361	1519.79	18.96	19	0.236	0.198
80.0	79.4	18.133	35.452	25.586	241.65	2.611	1517.82	18.12	20	0.239	0.254
90.0	89.4	17.471	35.483	25.772	224.23	2.844	1516.19	17.46	19	0.114	0.114
100.0	99.3	16.980	35.474	25.884	213.91	3.063	1514.89	16.96	18	0.125	0.083
120.0	119.1	16.396	35.488	26.033	200.34	3.477	1513.69	16.38	21	0.051	0.029
140.0	139.0	16.138	35.481	26.086	195.90	3.873	1513.13	16.12	19	0.045	0.055
160.0	158.8	15.744	35.424	26.133	191.92	4.251	1512.16	15.72	22	0.071	0.075
180.0	178.7	15.334	35.378	26.190	187.00	4.640	1511.28	15.31	19	0.057	0.025
200.0	198.5	15.055	35.351	26.231	183.41	5.009	1510.42	15.02	21	0.251	0.077
220.0	218.4	14.536	35.257	26.272	180.15	5.373	1509.15	14.50	16	0.193	0.119
240.0	238.2	13.960	35.193	26.344	173.67	5.726	1507.42	13.93	19	0.081	0.075
260.0	258.1	13.633	35.173	26.398	168.97	6.060	1506.80	13.60	19	0.017	0.017
280.0	277.9	13.264	35.121	26.433	165.98	6.404	1505.94	13.23	22	0.052	0.075
300.0	297.7	12.886	35.057	26.477	162.18	6.731	1504.45	12.85	23	0.075	0.074
320.0	317.6	12.367	35.002	26.529	158.35	7.052	1503.44	12.32	17	0.061	0.025
340.0	337.4	11.933	34.930	26.540	155.94	7.365	1502.15	11.89	18	0.111	0.136
360.0	357.2	11.491	34.900	26.588	150.49	7.569	1500.90	11.45	18	0.051	0.054
380.0	377.1	11.165	34.855	26.633	148.38	7.960	1500.11	11.12	19	0.070	0.098
400.0	396.9	10.723	34.786	26.659	146.04	8.253	1498.78	10.67	18	0.077	0.041
420.0	416.7	10.258	34.733	26.699	142.29	8.552	1497.41	10.21	20	0.096	0.097
440.0	436.5	9.961	34.707	26.730	139.57	8.831	1496.66	9.91	19	0.059	0.064
460.0	456.3	9.597	34.673	26.763	136.56	9.107	1495.55	9.54	17	0.047	0.059
480.0	476.2	9.262	34.626	26.783	134.76	9.178	1494.70	9.21	20	0.070	0.069
500.0	496.0	8.843	34.582	26.816	131.59	9.644	1493.45	8.79	20	0.057	0.052
550.0	545.5	8.311	34.530	26.858	127.97	10.292	1492.22	8.25	17	0.028	0.028
600.0	595.0	7.697	34.462	26.896	124.52	10.921	1490.57	7.64	21	0.035	0.036
700.0	694.0	6.860	34.400	26.966	118.36	12.135	1488.39	6.79	23	0.012	0.011
800.0	793.0	6.182	34.360	27.024	113.16	13.292	1487.93	6.11	21	0.016	0.010
900.0	891.9	5.608	34.342	27.082	107.31	14.397	1487.26	5.53	18	0.024	0.018
1000.0	990.8	4.968	34.343	27.158	100.55	15.438	1486.30	4.89	19	0.028	0.025
1100.0	1089.6	4.383	34.366	27.242	92.35	16.399	1485.57	4.30	21	0.015	0.016
1200.0	1188.4	3.819	34.395	27.322	84.30	17.281	1484.99	3.75	19	0.011	0.013
1300.0	1287.1	3.490	34.439	27.391	77.58	18.098	1485.22	3.39	20	0.009	0.006
1400.0	1385.8	3.152	34.482	27.456	71.20	18.839	1485.56	3.06	21	0.011	0.007
1500.0	1484.4	2.910	34.527	27.516	65.50	19.511	1486.18	2.80	18	0.005	0.004
1600.0	1583.0	2.730	34.557	27.555	61.73	20.148	1487.10	2.62	20	0.005	0.004
1700.0	1681.5	2.601	34.578	27.584	59.14	20.752	1488.25	2.48	18	0.001	0.000
1800.0	1780.0	2.524	34.589	27.599	57.96	21.337	1489.62	2.40	19	0.004	0.003
1900.0	1878.5	2.432	34.604	27.619	56.22	21.906	1490.89	2.30	18	0.002	0.003
2000.0	1976.9	2.361	34.613	27.632	55.20	22.464	1492.27	2.22	19	0.000	0.000
2030.0	2006.4	2.340	34.619	27.638	54.66	22.629	1492.66	2.20	139	0.000	0.001



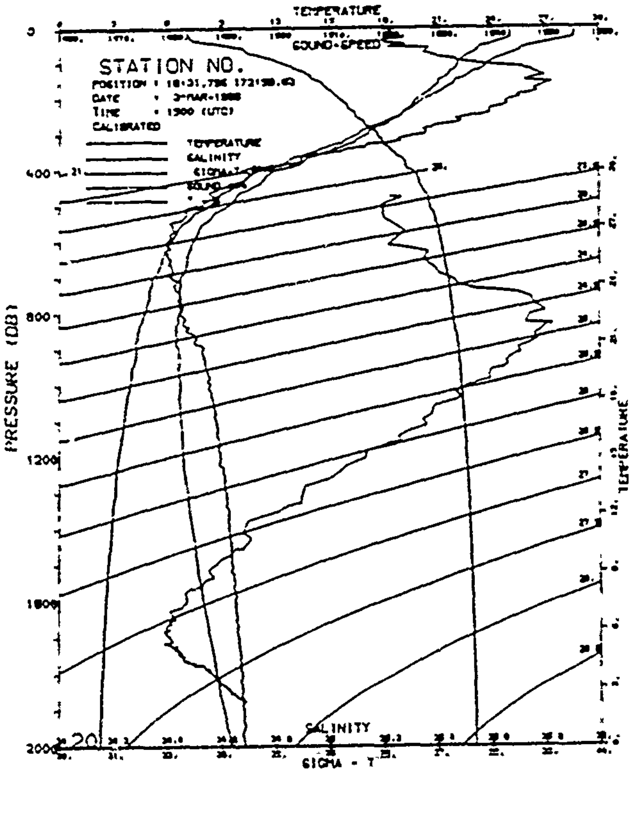


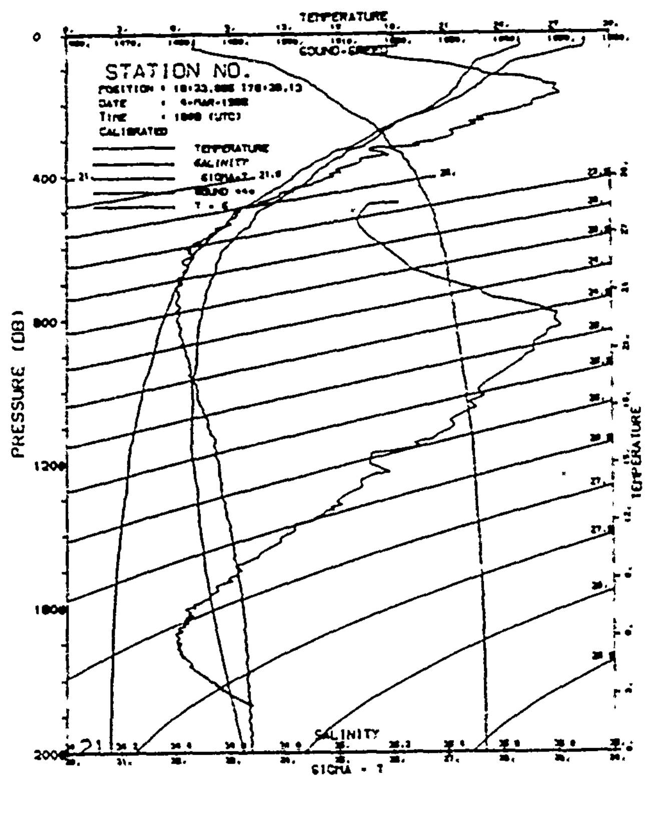
SHIP : HMAS COOK - Flinders
STATION NUMBER : 20 (THROUGH THE CRUISE)
STATION NUMBER : 20 (THROUGH THE YEAR)
DATE : 03-MAR-1986 (DAY NUMBER 62)
START TIME : 1500 GMT + 2
CRUISE : CR01/86
POSITION : 18:31.79S 172:59.63W
CAST DEPTH : 2351 METRES
BOTTOM DEPTH : 2869 METRES

PRES	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	28.637	35.223	22.354	547.54	0.547	1541.36	28.64	37	0.006	0.004
20.0	19.9	28.600	35.230	22.375	546.04	1.094	1541.49	28.60	21	0.019	0.006
30.0	29.8	28.524	35.243	22.457	543.41	1.639	1541.41	28.52	18	0.007	0.130
40.0	39.8	27.741	35.280	22.612	522.22	2.172	1540.62	27.73	20	0.371	0.303
50.0	49.7	26.532	35.226	23.039	483.00	2.675	1539.00	26.52	17	0.302	0.446
60.0	59.6	25.700	35.359	23.400	449.71	3.142	1537.58	25.69	17	0.045	0.038
70.0	69.6	25.428	35.309	23.476	442.70	3.580	1537.02	25.41	19	0.164	0.164
80.0	79.5	24.822	35.390	23.692	422.50	4.021	1535.69	24.81	17	0.109	0.102
90.0	89.4	24.250	35.440	23.900	402.31	4.433	1534.56	24.23	18	0.129	0.111
100.0	99.4	23.865	35.517	24.075	386.75	4.828	1532.88	23.86	21	0.094	0.360
120.0	119.3	23.270	35.734	24.411	355.43	5.560	1532.91	23.25	20	0.151	0.145
140.0	139.2	22.504	35.809	24.669	331.62	6.252	1531.59	22.56	17	0.077	0.076
160.0	159.0	21.874	35.821	24.879	312.28	6.898	1530.09	21.84	19	0.071	0.116
180.0	178.9	21.154	35.769	25.020	298.73	7.510	1528.55	21.16	18	0.074	0.062
200.0	198.7	20.398	35.690	25.184	284.43	8.095	1526.41	20.36	21	0.134	0.154
220.0	218.6	19.733	35.646	25.336	271.40	8.649	1525.[illegible]	19.69	18	[illegible]	[illegible]
240.0	238.4	19.061	35.505	25.454	259.70	9.182	1523.45	19.02	20	0.076	0.061
260.0	258.3	18.249	35.476	25.576	248.64	9.694	1521.32	18.20	18	0.154	0.145
280.0	278.2	17.357	35.373	25.716	235.63	10.179	1518.90	17.31	20	0.209	0.214
300.0	298.0	16.587	35.345	25.878	220.67	10.633	1516.94	16.54	20	0.075	0.099
320.0	317.9	15.798	35.250	25.991	209.98	11.065	1514.77	15.75	20	0.045	0.054
340.0	337.7	14.657	35.003	26.112	198.75	11.477	1511.27	14.61	20	0.195	0.218
360.0	357.5	13.435	34.908	26.234	187.00	11.862	1507.40	13.38	20	0.247	0.297
380.0	377.4	12.561	34.878	26.386	172.61	12.217	1504.88	12.51	21	0.070	0.094
400.0	397.2	11.278	34.670	26.468	164.41	12.555	1500.44	11.23	19	0.283	0.263
420.0	417.1	10.495	34.696	26.629	149.09	12.865	1498.20	10.44	19	0.060	0.063
440.0	436.9	10.043	34.642	26.666	145.69	13.159	1496.85	9.99	19	0.139	0.145
460.0	456.8	9.254	34.564	26.736	138.74	13.444	1494.21	9.20	20	0.139	0.139
480.0	476.6	8.738	34.557	26.813	131.40	13.711	1492.65	8.69	18	0.043	0.053
500.0	496.4	8.255	34.505	26.847	128.13	13.971	1491.13	8.20	18	0.097	0.110
550.0	546.0	6.834	34.416	26.982	114.63	14.572	1486.43	6.78	18	0.093	0.076
600.0	595.6	6.175	34.402	27.058	107.38	15.125	1484.65	6.12	18	0.055	0.054
700.0	694.7	5.173	34.415	27.192	94.57	16.137	1482.32	5.12	20	0.034	0.025
800.0	793.7	4.729	34.444	27.265	87.99	17.043	1482.13	4.67	19	0.050	0.044
900.0	892.7	4.256	34.528	27.384	77.00	17.860	1481.97	4.19	20	0.030	0.008
1000.0	991.7	3.929	34.555	27.440	71.93	18.605	1482.26	3.85	19	0.009	0.009
1100.0	1090.6	3.581	34.579	27.494	66.86	19.297	1482.50	3.50	21	0.010	0.007
1200.0	1189.5	3.290	34.595	27.534	63.05	19.946	1482.95	3.21	20	0.009	0.008
1300.0	1288.3	3.090	34.619	27.573	59.56	20.556	1483.76	3.00	22	0.007	0.005
1400.0	1387.1	2.909	34.626	27.595	57.51	21.139	1484.62	2.81	17	0.008	0.005
1500.0	1485.8	2.729	34.642	27.623	54.90	21.701	1485.51	2.62	18	0.012	0.005
1600.0	1584.5	2.600	34.653	27.644	53.07	22.239	1486.60	2.49	17	0.004	0.000
1700.0	1683.1	2.500	34.664	27.661	51.67	22.762	1487.88	2.38	18	0.004	0.002
1800.0	1781.7	2.403	34.670	27.681	49.93	23.272	1489.15	2.28	19	0.002	0.000
1900.0	1880.2	2.320	34.683	27.692	49.04	23.768	1490.48	2.19	18	0.009	0.002
2000.0	1978.7	2.261	34.686	27.699	48.57	24.257	1491.91	2.12	26	0.012	0.007
2020.0	1998.4	2.239	34.692	27.706	47.98	24.353	1492.10	2.10	33	0.000	0.003

SHIP : HMAS COOK - Flinders
STATION NUMBER : 21 (THROUGH THE CRUISE)
STATION NUMBER : 21 (THROUGH THE YEAR)
DATE : 04-MAR-1986 (DAY NUMBER 63)
START TIME : 1800 GMT + 2
CRUISE : CR01/86
POSITION : 19:22.06S 176:29.13W
CAST DEPTH : 2397 METRES
BOTTOM DEPTH : 2520 METRES

PRES	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	28.628	35.298	22.349	548.14	0.548	1541.26	28.62	31	0.005	0.004
20.0	19.9	28.617	35.236	22.356	547.80	1.096	1541.50	28.61	21	0.050	0.027
30.0	29.8	28.617	35.221	22.360	547.93	1.644	1541.64	28.61	19	0.002	0.007
40.0	39.8	28.535	35.147	22.332	551.11	2.193	1541.65	28.53	19	0.135	0.220
50.0	49.7	27.645	35.075	22.569	528.71	2.733	1541.09	27.63	18	0.235	0.226
60.0	59.6	26.806	35.122	22.834	499.99	3.248	1539.77	26.79	17	0.212	0.196
70.0	69.6	25.850	35.212	23.242	465.16	3.730	1537.73	25.83	19	0.346	0.312
80.0	79.5	24.915	35.313	23.606	430.80	4.178	1535.90	24.90	20	0.200	0.184
90.0	89.4	24.456	35.420	23.825	419.24	4.599	1535.07	24.44	17	0.083	0.063
100.0	99.4	24.232	35.465	23.927	400.08	5.004	1534.73	24.21	19	0.064	0.050
120.0	119.2	23.582	35.583	24.238	374.84	5.792	1533.53	23.56	20	0.120	0.074
140.0	139.1	23.040	35.756	24.497	347.70	6.495	1532.72	23.01	17	0.058	0.013
160.0	159.0	22.499	35.796	24.683	330.97	7.178	1531.56	22.47	21	0.139	0.131
180.0	178.8	21.923	35.788	24.848	316.73	7.823	1530.47	21.89	20	0.130	0.159
200.0	198.7	21.002	35.726	25.040	298.21	8.438	1528.25	20.96	20	0.134	0.147
220.0	218.6	20.148	35.650	25.220	281.65	9.018	1526.17	20.11	18	0.124	0.139
240.0	238.4	18.808	35.537	25.401	257.19	9.560	1522.56	18.77	21	0.229	0.228
260.0	258.3	17.875	35.501	25.607	237.92	10.055	1520.24	17.83	20	0.080	0.093
280.0	278.1	17.093	35.419	25.815	226.22	10.521	1518.15	17.05	19	0.103	0.092
300.0	298.0	16.524	35.363	25.907	217.99	10.964	1516.69	16.48	18	0.100	0.120
320.0	317.8	15.786	35.246	25.987	210.53	11.391	1514.56	15.74	17	0.112	0.221
340.0	337.7	14.599	35.103	26.201	190.26	11.795	1511.19	14.55	21	0.054	0.046
360.0	357.5	13.803	35.075	26.287	182.27	12.171	1508.80	13.75	19	0.093	0.066
380.0	377.4	13.190	35.006	26.360	175.52	12.528	1507.00	13.14	20	0.140	0.151
400.0	397.2	12.593	34.981	26.462	166.01	12.869	1505.41	12.54	20	0.035	0.025
420.0	417.0	12.136	34.918	26.500	162.54	13.198	1504.11	12.08	21	0.094	0.131
440.0	436.9	11.435	34.838	26.570	155.84	13.519	1501.95	11.38	20	0.061	0.069
460.0	456.7	10.779	34.774	26.630	149.18	13.826	1499.91	10.72	16	0.079	0.081
480.0	476.6	10.092	34.701	26.703	143.02	14.119	1497.75	10.04	15	0.082	0.091
500.0	496.4	9.362	34.639	26.777	135.79	14.400	1495.35	9.31	18	0.064	0.030
550.0	546.0	8.450	34.551	26.853	128.64	15.062	1492.73	8.39	18	0.094	0.081
600.0	595.5	7.366	34.482	26.929	121.06	15.682	1489.26	7.31	19	0.081	0.074
700.0	694.6	6.208	34.423	27.070	107.59	16.812	1486.45	6.15	18	0.020	0.020
800.0	793.7	5.371	34.436	27.161	98.92	17.842	1484.67	5.30	19	0.025	0.026
900.0	892.6	4.768	34.480	27.250	89.78	18.779	1483.94	4.69	18	0.019	0.015
1000.0	991.6	4.183	34.483	27.356	80.35	19.629	1483.24	4.11	20	0.009	0.007
1100.0	1090.5	3.742	34.521	27.431	73.08	20.397	1483.06	3.66	19	0.020	0.016
1200.0	1189.3	3.409	34.563	27.498	66.72	21.089	1483.39	3.32	19	0.004	0.004
1300.0	1288.2	3.191	34.579	27.531	63.70	21.746	1484.11	3.10	20	0.007	0.002
1400.0	1386.9	2.934	34.606	27.576	59.35	22.360	1484.70	2.81	21	0.012	0.008
1500.0	1485.6	2.726	34.632	27.616	55.57	22.937	1485.53	2.62	20	0.003	0.002
1600.0	1584.3	2.622	34.648	27.638	53.71	23.485	1486.74	2.51	18	0.003	0.004
1700.0	1682.9	2.536	34.660	27.655	52.38	24.014	1488.04	2.42	21	0.004	0.000
1800.0	1781.5	2.478	34.666	27.665	51.77	24.535	1489.48	2.35	18	0.004	0.004
1900.0	1880.0	2.434	34.674	27.675	51.16	25.048	1490.97	2.30	21	0.003	0.001
2000.0	1978.5	2.393	34.678	27.682	50.80	25.558	1492.47	2.25	52	0.004	0.001
2020.0	1998.2	2.381	34.681	27.685	50.54	25.659	1492.77	2.24	46	0.000	0.001



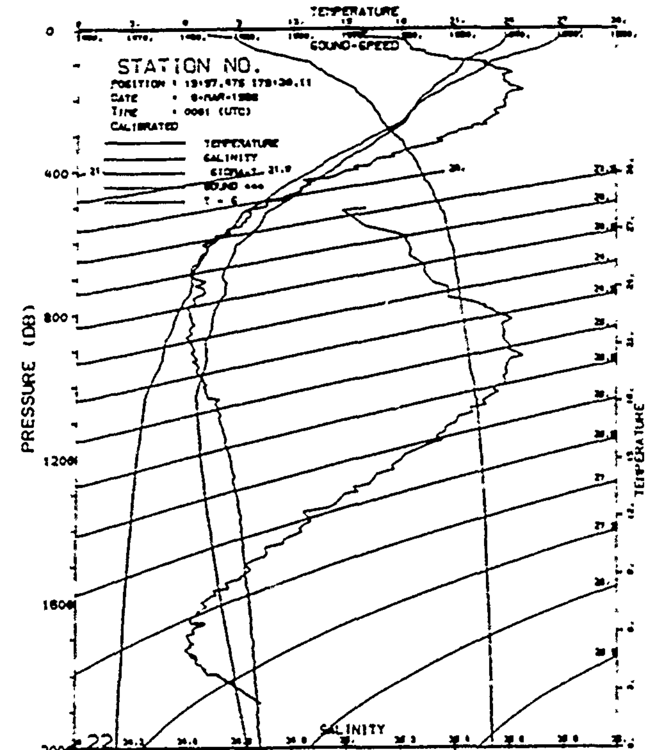


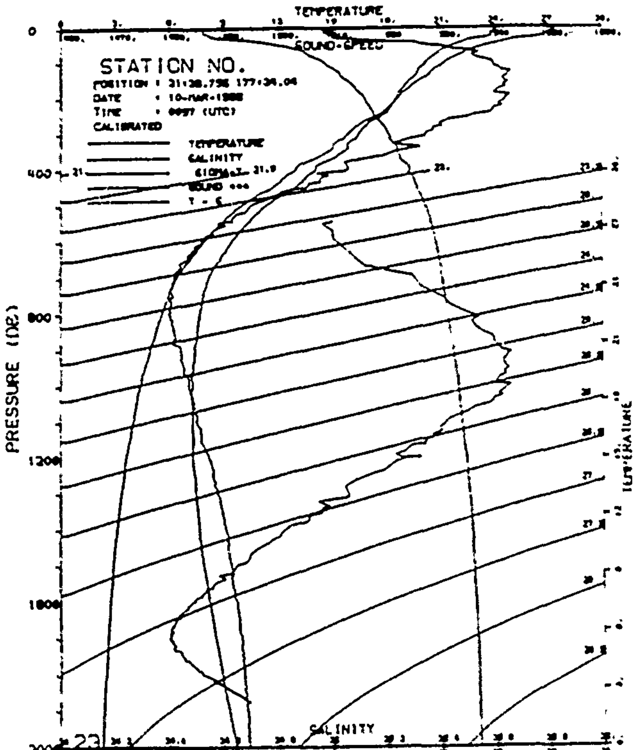
SHIP : HMAS COOK - Fleury
STATION NUMBER : 22 (THROUGH THE CRUISE)
STATION NUMBER : 2987 (THROUGH THE YEAR)
DATE : 06-MAR-1986 (DAY NUMBER 65)
START TIME : 0001 GMT - Z
CRUISE : CK1/86
POSITION : 19:57.47S 179:30.11W
CAST DEPTH : 1991 METRES
BOTTOM DEPTH : 2420 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	28.051	35.072	22.434	540.34	0.540	1541.04	28.05	26	0.006	0.012
20.0	19.9	27.852	35.000	22.556	512.50	1.076	1540.00	27.65	19	0.379	0.415
30.0	29.8	26.782	35.149	22.916	494.78	1.590	1539.28	26.78	22	0.134	0.088
40.0	39.8	26.449	35.219	23.059	481.43	2.078	1538.75	26.44	21	0.113	0.115
50.0	49.7	26.092	35.225	23.176	470.69	2.554	1538.06	26.08	20	0.100	0.152
60.0	59.6	25.539	35.248	23.365	452.90	3.006	1536.85	25.53	23	0.224	0.234
70.0	69.6	24.808	35.295	23.625	428.50	3.457	1535.29	24.79	19	0.208	0.225
80.0	79.5	24.072	35.362	23.896	403.05	3.872	1533.74	24.05	17	0.162	0.180
90.0	89.4	23.376	35.390	24.122	381.82	4.265	1532.08	23.36	19	0.297	0.219
100.0	99.4	22.919	35.515	24.349	360.54	4.636	1531.41	22.90	19	0.054	0.075
120.0	119.2	22.397	35.580	24.554	341.75	5.340	1530.46	22.37	20	0.093	0.068
140.0	139.1	21.595	35.584	24.776	321.21	6.005	1528.66	21.57	19	0.101	0.104
160.0	159.0	20.763	35.597	25.015	299.14	6.625	1526.73	20.73	19	0.132	0.136
180.0	178.8	20.155	35.613	25.190	283.08	7.203	1525.46	20.12	18	0.134	0.154
200.0	198.7	19.389	35.593	25.375	266.08	7.752	1523.66	19.35	17	0.091	0.095
220.0	218.5	18.884	35.587	25.508	254.64	8.273	1522.68	18.84	19	0.065	0.051
240.0	238.4	18.444	35.556	25.580	246.85	8.777	1521.63	18.40	19	0.048	0.056
260.0	258.3	18.083	35.519	25.650	241.52	9.265	1520.88	18.04	18	0.059	0.062
280.0	278.1	17.446	35.463	25.764	231.19	9.739	1519.26	17.40	21	0.100	0.095
300.0	298.0	16.639	35.370	25.884	220.05	10.190	1517.84	16.59	20	0.120	0.145
320.0	317.8	15.902	35.309	26.039	205.64	10.615	1515.16	15.85	19	0.047	0.055
340.0	337.6	15.227	35.227	26.097	200.40	11.022	1513.14	15.17	19	0.126	0.141
360.0	357.5	14.431	35.150	26.219	189.08	11.411	1510.93	14.38	19	0.073	0.099
380.0	377.3	13.736	35.092	26.314	180.15	11.781	1509.01	13.68	19	0.057	0.062
400.0	397.2	13.173	35.019	26.373	174.74	12.136	1507.38	13.12	18	0.282	0.108
420.0	417.0	12.429	34.934	26.455	166.97	12.477	1505.69	12.37	19	0.090	0.086
440.0	436.8	11.631	34.859	26.550	157.97	12.805	1502.65	11.57	19	0.076	0.086
460.0	456.7	11.085	34.820	26.621	151.26	13.114	1501.06	11.03	19	0.071	0.075
480.0	476.5	10.552	34.762	26.671	146.50	13.412	1499.41	10.49	17	0.060	0.063
500.0	496.3	9.851	34.690	26.735	140.20	13.700	1497.16	9.79	18	0.092	0.106
550.0	545.9	8.798	34.612	26.847	129.57	14.387	1494.08	8.74	18	0.038	0.034
600.0	595.5	7.623	34.485	26.925	121.69	14.997	1490.25	7.56	16	0.076	0.069
700.0	694.6	6.410	34.443	27.060	108.87	16.144	1487.27	6.35	21	0.008	0.012
800.0	793.6	5.580	34.420	27.146	100.66	17.198	1485.50	5.51	17	0.034	0.033
900.0	892.6	4.824	34.434	27.247	90.93	18.153	1484.13	4.75	19	0.009	0.017
1000.0	991.5	4.081	34.477	27.367	79.50	19.013	1482.74	4.00	18	0.020	0.025
1100.0	1090.4	3.669	34.536	27.451	71.06	19.753	1482.76	3.59	20	0.013	0.009
1200.0	1189.2	3.366	34.572	27.509	65.60	20.437	1483.18	3.28	19	0.009	0.006
1300.0	1288.0	3.150	34.597	27.549	61.98	21.077	1483.97	3.06	16	0.006	0.004
1400.0	1386.8	3.003	34.613	27.576	59.62	21.683	1485.01	2.90	19	0.005	0.004
1500.0	1485.5	2.863	34.628	27.600	57.51	22.268	1486.08	2.76	19	0.005	0.004
1600.0	1584.2	2.704	34.646	27.629	54.88	22.829	1487.07	2.59	16	0.006	0.004
1700.0	1682.8	2.582	34.657	27.649	53.11	23.369	1488.21	2.46	20	0.006	0.003
1800.0	1781.3	2.481	34.668	27.666	51.64	23.894	1489.44	2.35	19	0.003	0.001
1900.0	1879.9	2.373	34.680	27.685	49.97	24.400	1490.67	2.24	19	0.003	0.003
2000.0	1978.3	2.300	34.690	27.699	48.83	24.896	1492.07	2.16	33	0.000	0.001
2020.0	1998.0	2.291	34.693	27.702	48.55	24.993	1492.29	2.15	43	0.002	0.004

SHIP : HMAS COOK - Fleury
STATION NUMBER : 23 (THROUGH THE CRUISE)
STATION NUMBER : 23 (THROUGH THE YEAR)
DATE : 10-MAR-1986 (DAY NUMBER 69)
START TIME : 0057 GMT - Z
CRUISE : CK01/86
POSITION : 21:29.75S 177:34.04E
CAST DEPTH : 1971 METRES
BOTTOM DEPTH : 3836 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	27.268	34.982	22.620	522.22	0.522	1540.11	27.27	24	0.034	0.095
20.0	19.9	26.955	34.996	22.731	512.01	1.039	1539.56	26.95	20	0.038	0.044
30.0	29.8	26.382	34.978	22.899	496.34	1.543	1538.10	26.38	20	0.355	0.441
40.0	39.7	24.614	35.262	23.658	424.23	2.054	1534.46	24.61	21	0.290	0.151
50.0	49.7	23.710	35.359	24.008	391.92	2.412	1532.44	23.70	18	0.364	0.261
60.0	59.6	22.928	35.452	24.299	363.82	2.790	1530.94	22.92	19	0.235	0.211
70.0	69.6	22.383	35.531	24.515	343.60	3.143	1529.80	22.37	19	0.076	0.061
80.0	79.5	22.009	35.515	24.608	335.01	3.483	1528.90	21.99	19	0.150	0.139
90.0	89.4	21.561	35.561	24.758	320.12	3.818	1527.77	21.54	20	0.119	0.111
100.0	99.4	21.279	35.598	24.875	310.36	4.125	1527.33	21.26	16	0.049	0.053
120.0	119.2	20.616	35.634	25.082	291.24	4.728	1526.01	20.59	20	0.098	0.088
140.0	139.1	20.201	35.639	25.197	280.98	5.300	1525.22	20.17	21	0.103	0.118
160.0	158.9	19.552	35.640	25.369	265.23	5.845	1523.76	19.52	19	0.060	0.092
180.0	178.8	19.010	35.603	25.480	255.22	6.365	1522.53	18.98	19	0.084	0.104
200.0	198.7	18.649	35.642	25.601	244.28	6.862	1521.90	18.61	15	0.067	0.071
220.0	218.5	18.268	35.623	25.684	237.08	7.344	1521.07	18.23	18	0.054	0.049
240.0	238.4	17.796	35.571	25.761	230.31	7.812	1520.00	17.76	17	0.082	0.115
260.0	258.2	16.946	35.421	25.851	222.10	8.264	1517.54	16.90	19	0.153	0.158
280.0	278.1	16.284	35.307	25.903	210.18	8.696	1515.91	16.24	19	0.105	0.123
300.0	297.9	15.823	35.346	26.055	201.54	9.109	1514.78	15.78	16	0.058	0.067
320.0	317.8	15.269	35.253	26.108	198.85	9.513	1513.28	15.22	18	0.083	0.093
340.0	337.6	15.015	35.305	26.205	190.15	9.901	1512.91	14.96	18	0.062	0.089
360.0	357.5	14.358	35.185	26.254	185.64	10.278	1510.98	14.30	19	0.096	0.094
380.0	377.3	13.396	35.052	26.351	176.28	10.643	1508.00	13.34	21	0.158	0.171
400.0	397.1	12.955	35.051	26.442	168.10	10.985	1506.92	12.90	17	0.034	0.039
420.0	417.0	12.361	34.960	26.489	163.75	11.319	1505.08	12.30	17	0.082	0.108
440.0	436.8	11.905	34.912	26.539	159.17	11.640	1503.81	11.85	21	0.106	0.098
460.0	456.6	11.192	34.806	26.590	154.23	11.953	1501.54	11.13	18	0.151	0.136
480.0	476.5	10.550	34.756	26.666	146.95	12.252	1499.47	10.49	14	0.102	0.099
500.0	496.3	9.916	34.695	26.729	140.91	12.540	1497.54	9.86	19	0.109	0.108
550.0	545.9	8.772	34.598	26.840	130.19	13.215	1494.20	8.71	17	0.061	0.045
600.0	595.4	7.843	34.519	26.920	122.48	13.848	1491.43	7.78	19	0.029	0.024
700.0	694.5	6.382	34.416	27.042	110.48	15.012	1487.29	6.32	18	0.036	0.027
800.0	793.5	5.567	34.402	27.134	101.78	16.071	1485.67	5.50	17	0.023	0.015
900.0	892.5	4.935	34.441	27.239	91.85	17.041	1484.84	4.86	18	0.014	0.010
1000.0	991.5	4.407	34.476	27.326	81.59	17.916	1484.33	4.33	18	0.012	0.013
1100.0	1090.3	4.021	34.502	27.388	77.78	18.719	1484.38	3.94	19	0.031	0.024
1200.0	1189.1	3.615	34.546	27.464	70.48	19.460	1484.39	3.53	18	0.011	0.007
1300.0	1287.9	3.336	34.578	27.517	65.50	20.140	1484.91	3.24	17	0.013	0.008
1400.0	1386.7	3.083	34.608	27.565	60.95	20.772	1485.50	2.98	19	0.011	0.006
1500.0	1485.4	2.897	34.628	27.590	57.89	21.366	1486.43	2.79	17	0.002	0.003
1600.0	1584.0	2.730	34.649	27.629	54.98	21.933	1487.36	2.62	18	0.005	0.002
1700.0	1682.6	2.595	34.665	27.654	52.69	22.473	1488.49	2.48	19	0.004	0.001
1800.0	1781.2	2.487	34.673	27.670	51.38	22.995	1489.68	2.36	19	0.005	0.002
1900.0	1879.7	2.383	34.687	27.689	49.58	23.498	1490.99	2.25	18	0.004	0.001
2000.0	1978.1	2.302	34.694	27.702	48.52	23.989	1492.29	2.16	30	0.004	0.004
2010.0	1988.0	2.300	34.691	27.700	48.76	24.038	1492.33	2.16	30	0.000	0.004



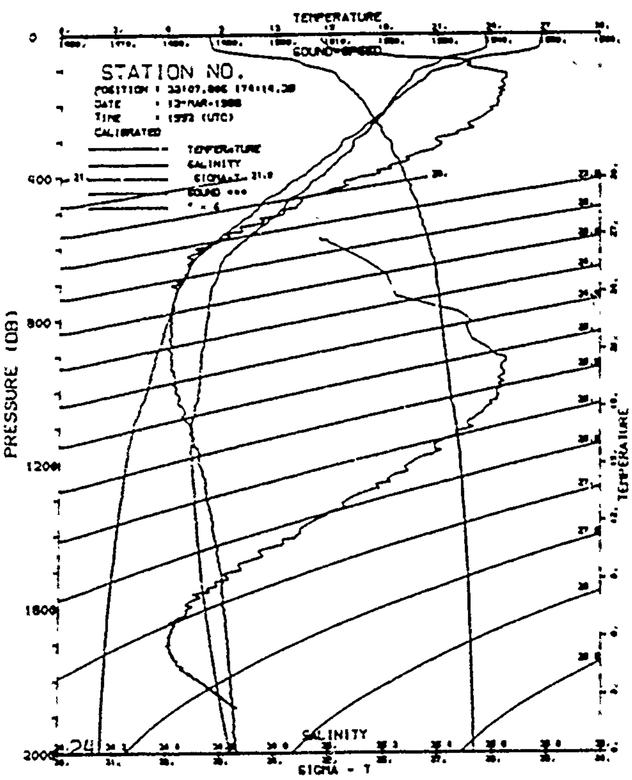


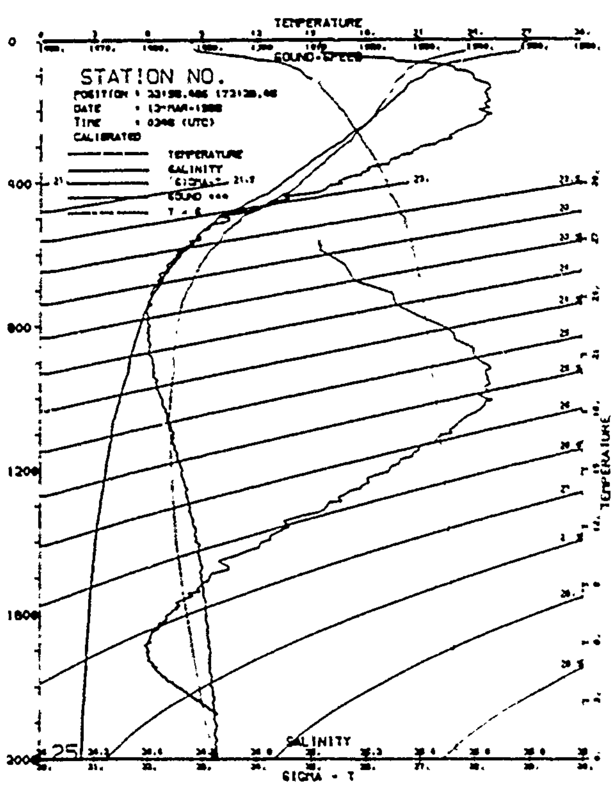
SHIP : HMAS COOK - Plessey
STATION NUMBER : 24 (THROUGH THE CRUISE)
STATION NUMBER : 24 (THROUGH THE YEAR)
DATE : 12-MAR-1986 (DAY NUMBER 71)
START TIME : 1552 GMT - Z
CRUISE : C01/86
POSITION : 23:07.80S 174:14.35E
CAST DEPTH : 1996 METRES
BOTTOM DEPTH : 4150 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
0.0	0.0	26.776	34.964	22.764	508.06	0.000	1538.77	26.77	1	0.000	0.000
10.0	9.9	26.759	34.967	22.771	507.75	0.500	1538.83	26.76	21	0.025	0.028
20.0	19.9	26.678	34.973	22.802	505.24	1.014	1538.86	26.67	23	0.010	0.005
30.0	29.8	26.663	34.987	22.817	504.17	1.519	1538.99	26.66	22	0.002	0.008
40.0	39.7	26.596	34.999	22.848	501.05	2.022	1538.94	26.59	18	0.078	0.088
50.0	49.7	25.913	35.093	23.132	474.05	2.510	1537.55	25.90	18	0.294	0.254
60.0	59.6	24.856	35.169	23.515	438.68	2.967	1535.81	24.84	18	0.355	0.417
70.0	69.5	23.173	35.406	24.193	374.28	3.374	1531.35	23.16	19	0.321	0.198
80.0	79.5	22.574	35.516	24.449	350.23	3.736	1530.26	22.56	16	0.114	0.110
90.0	89.4	22.110	35.504	24.572	338.91	4.080	1529.10	22.09	17	0.252	0.209
100.0	99.3	21.226	35.569	24.867	311.07	4.405	1527.08	21.21	20	0.100	0.174
120.0	119.2	20.429	35.656	25.149	284.88	4.994	1525.42	20.41	18	0.058	0.051
140.0	139.1	19.908	35.644	25.281	272.95	5.555	1524.26	19.87	18	0.075	0.053
160.0	158.9	19.375	35.635	25.421	260.23	6.088	1522.98	19.31	20	0.098	0.085
180.0	178.8	18.848	35.630	25.543	249.38	6.598	1521.92	18.82	19	0.083	0.102
200.0	198.6	18.403	35.619	25.647	239.97	7.086	1521.08	18.37	18	0.049	0.043
220.0	218.5	18.012	35.595	25.726	233.01	7.559	1520.18	17.97	17	0.055	0.068
240.0	238.3	17.528	35.553	25.813	225.31	8.018	1519.01	17.49	18	0.078	0.097
260.0	258.2	16.941	35.525	25.933	214.36	8.459	1517.59	16.90	17	0.059	0.041
280.0	278.0	16.520	35.471	25.990	209.34	8.883	1516.57	16.47	15	0.070	0.064
300.0	297.9	15.763	35.394	26.106	198.70	9.293	1514.49	15.72	19	0.098	0.081
320.0	317.7	15.554	35.390	26.150	195.05	9.685	1514.21	15.50	16	0.055	0.062
340.0	337.6	15.082	35.320	26.201	190.53	10.073	1512.91	15.03	17	0.067	0.085
360.0	357.4	14.510	35.281	26.295	181.94	10.445	1511.46	14.46	17	0.050	0.052
380.0	377.3	14.015	35.211	26.348	177.16	10.805	1510.05	13.96	17	0.044	0.071
400.0	397.1	13.463	35.111	26.386	173.79	11.155	1508.42	13.41	15	0.127	0.125
420.0	416.9	12.783	35.063	26.485	164.41	11.494	1506.50	12.73	17	0.063	0.010
440.0	436.8	12.376	35.005	26.521	161.28	11.820	1505.40	12.32	19	0.083	0.076
460.0	456.6	11.661	34.909	26.584	155.26	12.138	1503.13	11.60	22	0.107	0.115
480.0	476.4	11.219	34.879	26.642	149.83	12.442	1501.94	11.16	19	0.047	0.054
500.0	496.2	10.795	34.836	26.685	145.84	12.739	1500.77	10.73	20	0.039	0.036
550.0	545.8	9.493	34.676	26.784	136.24	13.450	1496.71	9.43	20	0.048	0.042
600.0	595.4	8.210	34.509	26.857	128.81	14.108	1492.53	8.15	18	0.080	0.091
700.0	694.4	6.784	34.430	27.000	115.07	15.302	1488.70	6.72	17	0.062	0.073
800.0	793.4	6.048	34.415	27.085	107.27	16.405	1487.47	5.98	19	0.029	0.023
900.0	892.4	5.378	34.414	27.167	99.55	17.442	1486.45	5.30	20	0.022	0.021
1000.0	991.3	4.847	34.431	27.242	92.49	18.400	1485.93	4.76	18	0.036	0.032
1100.0	1090.2	4.134	34.488	27.365	80.26	19.261	1484.72	4.05	18	0.005	0.002
1200.0	1189.0	3.747	34.523	27.432	73.79	20.030	1484.76	3.66	17	0.015	0.015
1300.0	1287.8	3.468	34.552	27.484	68.98	20.740	1485.32	3.37	17	0.012	0.005
1400.0	1386.5	3.198	34.580	27.531	64.40	21.404	1485.86	3.10	19	0.005	0.003
1500.0	1485.2	2.952	34.605	27.574	60.25	22.028	1486.48	2.84	20	0.005	0.005
1600.0	1583.8	2.753	34.615	27.599	57.83	22.618	1487.34	2.65	17	0.006	0.002
1700.0	1682.4	2.620	34.630	27.624	55.56	23.183	1488.39	2.50	19	0.005	0.003
1800.0	1781.0	2.498	34.642	27.644	53.79	23.729	1489.57	2.37	20	0.005	0.004
1900.0	1879.5	2.380	34.653	27.663	52.00	24.256	1490.73	2.25	18	0.002	0.000
2000.0	1977.9	2.310	34.666	27.679	50.66	24.770	1492.15	2.17	20	0.000	0.000
2020.0	1997.6	2.293	34.664	27.679	50.68	24.871	1492.34	2.15	164	0.005	0.003

SHIP : HMAS COOK - Plessey
STATION NUMBER : 25 (THROUGH THE CRUISE)
STATION NUMBER : 25 (THROUGH THE YEAR)
DATE : 13-MAR-1986 (DAY NUMBER 72)
START TIME : 0346 GMT - Z
CRUISE : C01/86
POSITION : 23:56.49S 172:29.46E
CAST DEPTH : 2010 METRES
BOTTOM DEPTH : 4516 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
0.0	0.0	26.931	35.047	22.777	506.77	0.000	1539.12	26.93	4	0.006	0.011
10.0	9.9	26.828	35.028	22.795	505.47	0.506	1539.00	26.83	25	0.092	0.111
20.0	19.9	26.703	35.037	22.842	501.41	1.010	1538.94	26.70	20	0.007	0.004
30.0	29.8	26.670	35.034	22.850	501.03	1.511	1539.04	26.66	19	0.022	0.014
40.0	39.7	26.029	35.085	23.090	478.46	2.001	1537.59	26.02	22	0.394	0.148
50.0	49.7	24.606	35.230	23.636	426.73	2.453	1534.37	24.60	16	0.346	0.260
60.0	59.6	23.606	35.324	24.005	391.90	2.862	1532.11	23.59	19	0.426	0.394
70.0	69.5	22.525	35.479	24.435	351.18	3.234	1529.85	22.51	19	0.187	0.146
80.0	79.5	21.989	35.531	24.626	333.38	3.576	1528.68	21.97	20	0.154	0.157
90.0	89.4	21.531	35.576	24.788	318.29	3.902	1527.75	21.51	18	0.088	0.074
100.0	99.3	21.322	35.601	24.865	311.32	4.217	1527.41	21.30	17	0.044	0.048
120.0	119.2	20.605	35.628	25.081	291.39	4.822	1525.79	20.58	19	0.127	0.112
140.0	139.1	20.246	35.658	25.200	280.71	5.391	1525.26	20.22	18	0.033	0.042
160.0	158.9	19.765	35.651	25.321	269.80	5.943	1524.20	19.74	17	0.073	0.071
180.0	178.8	19.323	35.645	25.432	259.07	6.472	1523.27	19.29	19	0.087	0.094
200.0	198.6	18.866	35.620	25.531	251.07	6.981	1522.21	18.83	19	0.105	0.092
220.0	218.5	18.461	35.637	25.646	240.70	7.470	1521.48	18.42	16	0.071	0.065
240.0	238.3	17.962	35.601	25.743	232.04	7.942	1520.32	17.92	17	0.085	0.097
260.0	258.2	17.336	35.539	25.849	222.45	8.397	1518.72	17.29	17	0.067	0.058
280.0	278.0	16.872	35.502	25.931	215.11	8.834	1517.68	16.83	17	0.066	0.085
300.0	297.9	16.294	35.422	26.005	208.46	9.259	1516.15	16.25	18	0.103	0.146
320.0	317.7	15.633	35.352	26.103	199.54	9.666	1514.37	15.58	19	0.092	0.121
340.0	337.6	15.019	35.285	26.188	191.69	10.056	1512.71	14.97	19	0.081	0.075
360.0	357.4	14.527	35.229	26.252	185.95	10.435	1511.35	14.47	22	0.115	0.118
380.0	377.2	13.983	35.165	26.319	179.86	10.800	1509.89	13.93	19	0.071	0.084
400.0	397.1	13.410	35.099	26.387	173.58	11.154	1508.27	13.35	18	0.074	0.051
420.0	416.9	12.925	35.043	26.442	168.62	11.458	1506.89	12.87	16	0.071	0.065
440.0	436.7	12.214	34.904	26.474	165.57	11.832	1504.54	12.16	18	0.132	0.124
460.0	456.6	11.422	34.849	26.581	155.32	12.153	1502.21	11.36	19	0.087	0.072
480.0	476.4	10.747	34.767	26.640	149.59	12.457	1500.03	10.69	17	0.141	0.125
500.0	496.2	9.886	34.694	26.732	140.51	12.750	1497.29	9.83	15	0.063	0.061
550.0	545.8	8.712	34.594	26.846	129.58	13.431	1493.81	8.65	18	0.030	0.023
600.0	595.3	7.806	34.510	26.918	122.63	14.067	1491.11	7.74	20	0.050	0.039
700.0	694.4	6.453	34.411	27.029	111.83	15.236	1487.39	6.39	19	0.050	0.044
800.0	793.4	5.547	34.403	27.137	101.48	16.297	1485.45	5.48	21	0.018	0.020
900.0	892.3	4.974	34.418	27.217	94.04	17.276	1484.80	4.90	19	0.012	0.010
1000.0	991.3	4.425	34.452	27.305	85.58	18.180	1484.21	4.15	19	0.015	0.010
1100.0	1090.1	3.979	34.494	27.386	77.89	18.996	1484.09	3.90	19	0.000	0.003
1200.0	1188.9	3.649	34.527	27.446	72.24	19.751	1484.38	3.56	17	0.004	0.001
1300.0	1287.7	3.345	34.554	27.497	67.34	20.452	1484.79	3.25	18	0.005	0.004
1400.0	1386.4	3.043	34.577	27.544	62.74	21.102	1485.18	2.94	24	0.012	0.004
1500.0	1485.1	2.878	34.598	27.575	59.86	21.713	1486.14	2.77	17	0.006	0.006
1600.0	1583.8	2.716	34.615	27.603	57.29	22.297	1487.17	2.60	23	0.004	0.003
1700.0	1682.3	2.587	34.630	27.626	55.20	22.861	1488.28	2.47	20	0.004	0.000
1800.0	1780.9	2.478	34.637	27.642	53.84	23.409	1489.47	2.35	19	0.007	0.003
1900.0	1879.4	2.368	34.649	27.660	52.17	23.938	1490.68	2.23	20	0.004	0.004
2000.0	1977.8	2.282	34.659	27.676	50.85	24.455	1492.03	2.14	49	0.004	0.000
2040.0	2017.2	2.249	34.662	27.681	50.38	24.657	1492.46	2.11	7	0.000	0.000



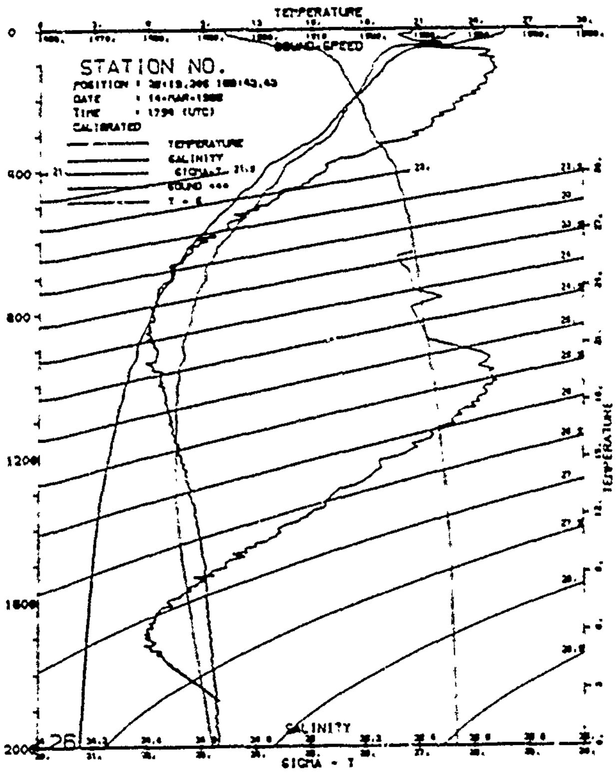


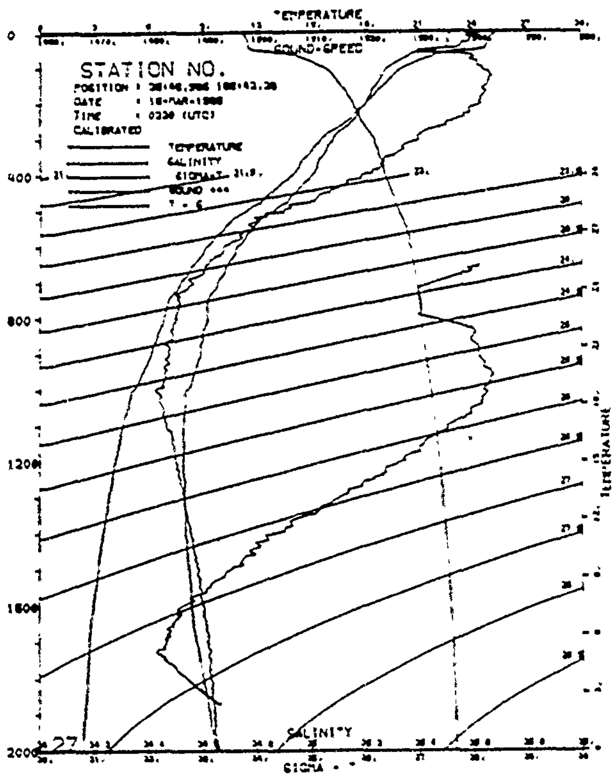
SHIP : HMAS COOK - Plessey
STATION NUMBER : 26 (THROUGH THE CRUISE)
STATION NUMBER : 26 (THROUGH THE YEAR)
DATE : 14-MAR-1986 (DAY NUMBER 73)
START TIME : 1754 GMT - Z
CRUISE : CR01/86
POSITION : 25:19.20S 169:43.43E
CAST DEPTH : 1995 METRES
BOTTOM DEPTH : 2409 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
0.0	0.0	25.694	35.371	23.411	446.29	0.000	1536.67	25.69	9	0.000	0.003
10.0	9.9	25.700	35.371	23.409	446.88	0.447	1536.80	25.70	19	0.006	0.018
20.0	19.9	25.307	35.316	23.464	441.99	0.891	1536.09	25.30	18	0.206	0.221
30.0	29.8	24.760	35.319	23.657	423.97	1.324	1534.73	24.75	18	0.267	0.309
40.0	39.7	23.491	35.468	24.147	377.53	1.725	1531.85	23.48	16	0.152	0.123
50.0	49.7	22.323	35.366	24.406	353.17	2.090	1528.74	22.31	19	0.791	0.039
60.0	59.6	20.507	35.611	25.094	287.96	2.411	1524.50	20.50	19	0.184	0.141
70.0	69.5	20.084	35.648	25.235	274.85	2.692	1523.60	20.07	19	0.148	0.155
80.0	79.5	19.677	35.640	25.336	265.59	2.962	1522.58	19.66	21	0.125	0.085
90.0	89.4	19.429	35.656	25.413	258.60	3.224	1522.16	19.41	17	0.099	0.120
100.0	99.3	19.143	35.670	25.498	250.83	3.479	1521.49	19.12	20	0.041	0.036
120.0	119.2	18.903	35.667	25.557	245.89	3.975	1521.17	18.88	19	0.056	0.071
140.0	139.0	18.521	35.637	25.631	239.51	4.461	1520.33	18.50	18	0.075	0.070
160.0	158.9	18.181	35.625	25.707	232.83	4.932	1519.70	18.15	19	0.059	0.075
180.0	178.8	17.772	35.591	25.782	226.35	5.390	1518.79	17.74	18	0.090	0.103
200.0	198.6	17.290	35.547	25.866	218.92	5.835	1517.67	17.26	19	0.082	0.071
220.0	218.5	16.859	35.523	25.950	211.43	6.266	1516.66	16.82	17	0.037	0.035
240.0	238.3	16.567	35.475	25.983	208.85	6.686	1516.05	16.53	16	0.086	0.085
260.0	258.2	16.213	35.446	26.042	203.71	7.099	1515.26	16.17	21	0.067	0.060
280.0	278.0	15.926	35.427	26.094	199.31	7.501	1514.73	15.88	15	0.055	0.062
300.0	297.8	15.521	35.390	26.158	193.69	7.896	1513.74	15.47	17	0.055	0.046
320.0	317.7	14.968	35.309	26.218	188.29	8.278	1512.22	14.92	17	0.097	0.111
340.0	337.5	14.123	35.220	26.332	177.67	8.644	1509.79	14.07	20	0.134	0.132
360.0	357.4	13.526	35.146	26.400	171.43	8.992	1508.06	13.47	16	0.088	0.111
380.0	377.2	12.740	35.058	26.491	162.85	9.327	1505.86	12.69	17	0.093	0.083
400.0	397.0	12.376	35.047	26.554	157.15	9.645	1504.80	12.32	19	0.021	0.025
420.0	416.9	12.082	34.999	26.573	155.60	9.958	1504.08	12.03	20	0.045	0.042
440.0	436.7	11.742	34.961	26.608	152.51	10.266	1503.17	11.69	19	0.053	0.049
460.0	456.5	11.121	34.885	26.664	147.19	10.568	1501.29	11.06	18	0.065	0.051
480.0	476.3	10.806	34.860	26.702	143.82	10.858	1500.53	10.75	17	0.045	0.041
500.0	496.2	10.451	34.803	26.720	142.21	11.144	1499.49	10.39	17	0.069	0.064
550.0	545.7	9.370	34.684	26.811	133.61	11.834	1496.31	9.31	17	0.055	0.042
600.0	595.3	8.488	34.583	26.873	127.72	12.487	1493.74	8.42	17	0.054	0.047
700.0	694.3	7.271	34.491	26.980	117.65	13.705	1490.72	7.20	18	0.007	0.008
800.0	793.3	6.194	34.420	27.070	108.9	14.841	1488.06	6.12	18	0.013	0.012
900.0	892.3	5.401	34.434	27.179	98.43	15.886	1486.56	5.32	19	0.004	0.005
1000.0	991.2	4.726	34.455	27.274	89.17	16.833	1485.46	4.64	18	0.018	0.008
1100.0	1090.0	4.303	34.487	27.346	82.40	17.691	1485.38	4.22	19	0.009	0.014
1200.0	1188.8	3.873	34.524	27.421	75.21	18.482	1485.32	3.78	20	0.014	0.009
1300.0	1287.6	3.492	34.550	27.480	69.42	19.204	1485.37	3.40	16	0.015	0.008
1400.0	1386.3	3.219	34.588	27.536	64.06	19.868	1485.93	3.12	17	0.005	0.005
1500.0	1485.0	2.979	34.613	27.578	59.96	20.490	1486.60	2.87	19	0.003	0.003
1600.0	1583.6	2.836	34.621	27.597	58.31	21.083	1487.65	2.72	19	0.005	0.003
1700.0	1682.2	2.677	34.635	27.623	55.90	21.658	1488.66	2.56	18	0.005	0.004
1800.0	1780.7	2.550	34.644	27.641	54.28	22.211	1489.80	2.42	17	0.004	0.000
1900.0	1879.2	2.439	34.654	27.658	52.68	22.744	1490.97	2.30	19	0.004	0.004
2000.0	1977.6	2.328	34.662	27.674	51.23	23.262	1492.17	2.19	16	0.004	0.003
2020.0	1997.3	2.320	34.667	27.679	50.83	23.364	1492.46	2.18	26	0.000	0.004

SHIP : HMAS COOK - Plessey
STATION NUMBER : 27 (THROUGH THE CRUISE)
STATION NUMBER : 27 (THROUGH THE YEAR)
DATE : 16-MAR-1986 (DAY NUMBER 75)
START TIME : 0220 GMT - Z
CRUISE : CR01/86
POSITION : 26:46.58S 166:42.28E
CAST DEPTH : 2002 METRES
BOTTOM DEPTH : 3440 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
0.0	0.0	25.174	35.623	23.761	412.85	0.000	1535.70	25.17	27	0.010	0.014
10.0	9.9	25.113	35.590	23.755	413.85	0.413	1535.63	25.11	16	0.093	0.122
20.0	19.9	24.950	35.597	23.809	409.02	0.825	1535.42	24.95	22	0.015	0.019
30.0	29.8	24.891	35.587	23.820	408.42	1.234	1535.38	24.88	20	0.021	0.013
40.0	39.7	24.776	35.557	23.832	407.60	1.642	1535.27	24.77	17	0.033	0.030
50.0	49.7	24.621	35.514	23.846	406.68	2.049	1534.88	24.61	17	0.148	0.227
60.0	59.6	22.927	35.414	24.270	366.50	2.435	1530.36	22.92	17	0.315	0.661
70.0	69.5	21.788	35.612	24.744	321.72	2.779	1528.17	21.77	20	0.104	0.111
80.0	79.5	21.239	35.605	24.891	308.10	3.094	1526.79	21.22	18	0.181	0.151
90.0	89.4	20.714	35.625	25.049	293.38	3.395	1525.58	20.70	19	0.153	0.149
100.0	99.3	20.232	35.632	25.184	280.86	3.682	1524.45	20.21	19	0.128	0.112
120.0	119.2	19.620	35.668	25.372	263.55	4.225	1523.17	19.60	19	0.071	0.073
140.0	139.0	19.244	35.667	25.469	254.95	4.743	1522.45	19.22	18	0.044	0.046
160.0	158.9	18.785	35.639	25.566	246.43	5.245	1521.43	18.76	17	0.089	0.092
180.0	178.7	18.428	35.643	25.659	238.17	5.727	1520.75	18.40	18	0.048	0.049
200.0	198.6	18.057	35.631	25.743	230.77	6.196	1520.02	18.02	16	0.052	0.049
220.0	218.4	17.606	35.589	25.821	223.89	6.652	1518.95	17.57	14	0.071	0.060
240.0	238.3	17.284	35.574	25.888	218.12	7.094	1518.35	17.24	17	0.033	0.041
260.0	258.1	16.780	35.507	25.957	212.02	7.525	1517.06	16.74	16	0.079	0.074
280.0	278.0	16.160	35.435	26.046	203.91	7.941	1515.39	16.12	18	0.109	0.124
300.0	297.8	15.570	35.391	26.147	194.71	8.338	1513.91	15.52	21	0.071	0.049
320.0	317.7	15.233	35.347	26.189	191.16	8.724	1513.15	15.18	20	0.064	0.069
340.0	337.5	14.939	35.327	26.238	186.95	9.101	1512.52	14.89	19	0.043	0.049
360.0	357.3	14.490	35.272	26.294	182.04	9.471	1511.38	14.44	20	0.057	0.052
380.0	377.2	14.271	35.267	26.337	178.37	9.832	1511.02	14.21	21	0.007	0.006
400.0	397.0	13.997	35.208	26.349	177.60	10.188	1510.35	13.94	20	0.068	0.091
420.0	416.8	13.478	35.134	26.400	172.97	10.537	1508.92	13.42	18	0.115	0.115
440.0	436.6	13.025	35.090	26.459	167.63	10.877	1507.71	12.96	19	0.084	0.094
460.0	456.5	12.510	35.034	26.517	162.21	11.207	1506.27	12.45	21	0.076	0.074
480.0	476.3	12.168	34.978	26.541	160.20	11.529	1505.36	12.10	19	0.102	0.141
500.0	496.1	11.470	34.901	26.613	153.27	11.841	1503.20	11.41	15	0.089	0.092
550.0	545.7	10.173	34.799	26.765	138.74	12.574	1499.35	10.11	18	0.023	0.028
600.0	595.2	9.237	34.680	26.829	132.69	13.252	1496.52	9.17	17	0.065	0.058
700.0	694.2	7.785	34.570	26.968	119.50	14.513	1492.78	7.71	18	0.018	0.016
800.0	793.2	6.879	34.508	27.048	112.13	15.666	1490.94	6.80	20	0.015	0.016
900.0	892.2	6.127	34.482	27.127	104.72	16.751	1489.60	6.04	20	0.013	0.010
1000.0	991.1	5.129	34.428	27.207	96.39	17.755	1486.98	5.04	18	0.073	0.064
1100.0	1089.9	4.578	34.472	27.304	87.03	18.666	1486.[illegible]	4.49	16	0.011	0.009
1200.0	1188.7	4.155	34.508	27.378	79.93	19.497	1486.50	4.06	18	0.016	0.012
1300.0	1287.5	3.822	34.539	27.438	74.32	20.268	1486.80	3.72	21	0.010	0.007
1400.0	1386.2	3.483	34.562	27.490	69.16	20.986	1486.93	3.38	19	0.008	0.007
1500.0	1484.8	3.194	34.591	27.540	64.23	21.652	1487.48	3.08	17	0.005	0.003
1600.0	1583.4	2.935	34.609	27.579	60.35	22.278	1488.01	2.82	17	0.004	0.004
1700.0	1682.0	2.730	34.625	27.610	57.31	22.864	1488.89	2.61	19	0.005	0.001
1800.0	1780.5	2.616	34.635	27.628	55.68	23.429	1490.09	2.49	20	0.006	0.004
1900.0	1879.0	2.500	34.648	27.648	53.86	23.978	1491.28	2.36	21	0.004	0.009
2000.0	1977.4	2.379	34.665	27.672	51.60	24.506	1492.41	2.24	20	0.001	0.001
2030.0	2006.9	2.339	34.670	27.680	50.85	24.660	1492.69	2.19	35	0.002	0.001



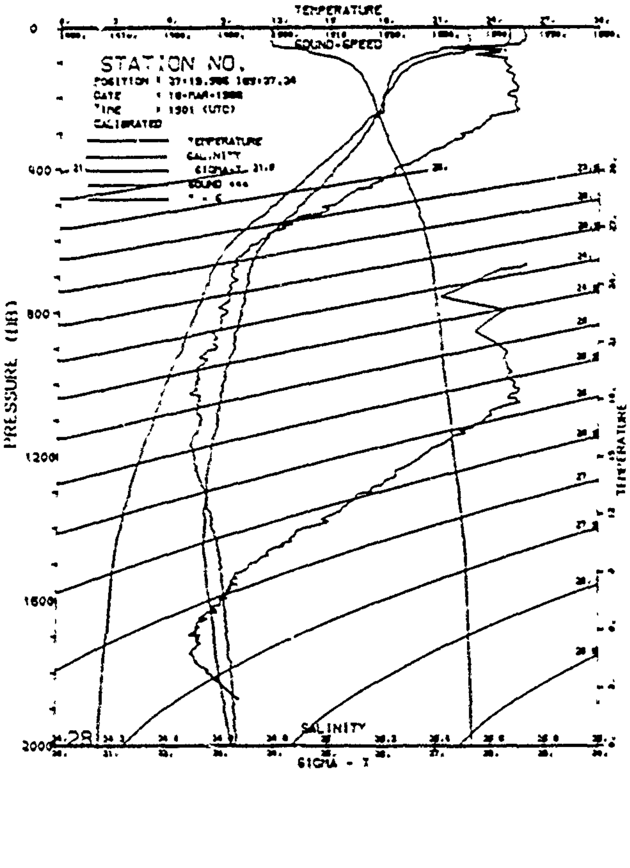


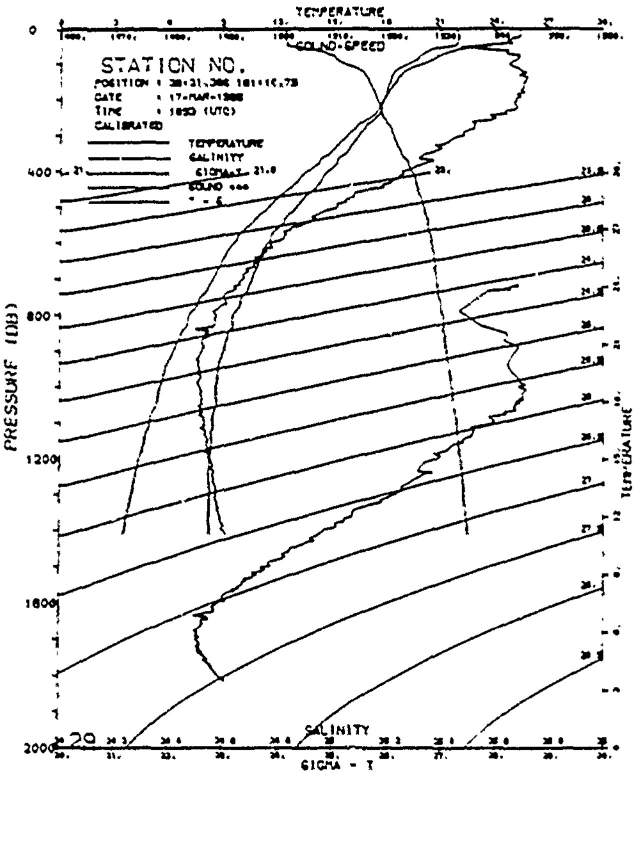
SHIP : HMAS COOK - Plessey
STATION NUMBER : 28 (THROUGH THE CRUISE)
STATION NUMBER : 28 (THROUGH THE YEAR)
DATE : 16-MAR-1986 (DAY NUMBER 75)
START TIME : 1501 GMT - Z
CRUISE : CP01/86
POSITION : 27:19.56S 165:27.24E
CAST DEPTH : 1994 METRES
BOTTOM DEPTH : 3550 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
0 0	0.0	25.016	35.726	23.887	400.82	0.000	1535.55	25.02	12	0.000	0.005
10.0	9.9	25.016	35.726	23.887	401.21	0.401	1535.58	25.01	23	0.000	0.004
20.0	19.9	25.018	35.731	23.890	401.34	0.802	1535.63	25.01	19	0.003	0.004
30.0	29.8	25.023	35.733	23 890	401.69	1.204	1535.83	25.02	18	0.004	0.005
40.0	39.7	24.993	35.722	23.891	402.05	1.606	1536.00	24.98	19	0.020	0.035
50.0	49.7	24.863	35.701	23.920	399.60	2.007	1535.76	24.83	17	0.048	0.068
60.0	59.6	23.400	35.482	24.184	374.76	2.394	1531.96	23.39	19	0.763	0.713
70.0	69.5	22.479	35.638	24.569	338.40	2.758	1530.08	22.46	22	0.136	0.190
80.0	79.5	21.388	35.585	24.934	313.48	3 076	1527.21	21.37	15	0.299	0.198
90 0	89.4	20.535	35.635	25.104	288.05	3.377	1525.19	20.52	19	0.212	0.178
100.0	99.3	19.995	35.658	25.266	272.98	3.656	1523.91	19.98	19	0.167	0.175
120.0	119.2	19.329	35.672	25.452	255.96	4.183	1522.36	19.31	20	0.078	0.110
140.0	139.0	18.822	35 691	25.596	242.88	4.608	1521.32	18 80	18	0.032	0.034
160.0	158.9	18.555	35 695	25.667	236.78	5.168	1520.88	18.53	18	0.032	0.025
180.0	178.7	18.312	35.693	25.726	231.73	5.628	1520.46	18.28	17	0.051	0.063
200.0	198.6	18.016	35.699	25.805	224.90	6.085	1519.97	17.98	17	0.009	0.011
220.0	218.4	17.862	35.695	25 840	222.20	6.533	1519.88	17.82	17	0.020	0.020
240.0	238.3	17.704	35.667	25.857	221.14	5.975	1519.67	17.66	17	0.065	0.077
260.0	258.1	17.134	35.598	25.942	213.56	7.411	1518.19	17.09	19	0.045	0.051
280.0	278.0	16.804	35.562	25.993	209.20	7.934	1517.47	16.76	15	0.047	0.042
300.0	297.8	16.398	35.503	26 044	204.87	8.248	1516.52	16.35	22	0.108	0.126
320.0	317.6	16.069	35.464	26.089	201.00	8.652	1515.88	16.02	21	0.073	0.080
340.0	337.5	15.628	35.425	26.160	194 68	9.047	1514.73	15.57	15	0.054	0.071
360.0	357.3	15.140	35.367	26.225	188.90	9.432	1513.49	15.08	22	0.069	0.082
380.0	377.1	14 675	35.315	26.287	183.34	9.805	1512.23	14.62	20	0.070	0.074
400.0	397.0	14.160	35.245	26.343	178.25	10.167	1510.97	14.10	20	0.074	0.070
420.0	416.8	13.779	35.214	26.399	173.26	10.518	1510.00	13.72	18	0.076	0.081
440.0	436.6	13.375	35.166	26.446	169.08	10.859	1508 87	13.31	21	0.086	0.098
460 0	456.5	12.841	35.098	26.501	164.00	11.192	1507.37	12.78	20	0.117	0.113
480.0	476.3	12.329	35.051	26.566	157.94	11.513	1505.86	12.26	16	0.058	0.076
500.0	496.1	11.895	34.996	26.606	154.25	11.824	1504.58	11.83	20	0.136	0.160
550.0	545.6	10.595	34.860	26.739	141.64	12.564	1500.92	10.53	18	0.053	0.045
600.0	595.2	9.627	34.743	26.814	134.55	13.256	1498.07	9.56	17	0.048	0.042
700.0	694.2	8.337	34.648	26.947	122.33	14.536	1494.96	8.26	19	0.006	0.009
800.0	793.2	7.607	34.626	27.038	114.30	15.725	1493.81	7.53	18	0.007	0.011
900.0	892.1	6.895	34.586	27.107	108.13	16.836	1492.63	6.81	15	0.010	0.019
1000.0	991.0	5.926	34.513	27.177	100.95	17.887	1490.29	5 84	16	0.040	0.036
1100.0	1089.9	5.262	34.531	27.273	91.64	18.852	1489.46	5.17	19	0.012	0.015
1200.0	1188.7	4.583	34.511	27.335	85.20	19.742	1488.25	4.48	19	0.016	0.010
1300.0	1287.4	3.994	34.550	27.429	75.70	20.545	1487.44	3.89	19	0.010	0.007
1400.0	1386.1	3.531	34.577	27.497	68.69	21.265	1487.20	3.43	18	0.019	0.017
1500.0	1484.8	3.154	34.606	27.556	62.63	21.913	1487.38	3.04	19	0.010	0.009
1600 0	1583.4	2.967	34.622	27.587	59.77	22.521	1488.22	2.85	21	0.008	0.006
1700.0	1681.9	2.793	34.634	27.612	57.40	23.108	1489.20	2.67	13	0.006	0.008
1800.0	1780.4	2.597	34.651	27.643	54.27	23.664	1490.01	2.47	19	0.004	0.003
1900.0	1878.9	2.475	34.661	27.661	52.56	24.197	1491.18	2.34	16	0.005	0.002
2000.0	1977.3	2.367	34.671	27.678	51.05	24.714	1492.45	2.22	21	0.007	0.004
2020.0	1997.0	2.350	34.673	27.681	50.75	24 815	1492.61	2.21	20	0.002	0.008

SHIP : HMAS COOK - Plessey
STATION NUMBER : 29 (THROUGH THE CRUISE)
STATION NUMBER : 29 (THROUGH THE YEAR)
DATE : 17-MAR-1986 (DAY NUMBER 76)
START TIME : 1853 GMT - Z
CRUISE : CP01/86
POSITION : 29:21.38S 161:14.79E
CAST DEPTH : 1390 METRES
BOTTOM DEPTH : 1450 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
0.0	0.0	24.071	35 690	24.144	376.31	0.090	1533.11	24.07	13	0.005	0 004
10.0	9.9	24.070	35 693	24.147	376.45	0.376	1533.24	24.07	16	0.004	0.004
20.0	19.9	24.069	35 692	24.146	376.86	0.753	1533.40	24.06	17	0.004	0.004
30.0	29.8	24.005	35.664	24.144	377.45	1.130	1533.36	24.00	18	0.051	0.078
40.0	39.7	23.866	35.650	24.101	374.33	1.506	1533.19	23.86	18	0.012	0 013
50.0	49.7	23.393	35.518	24.214	371.58	1.879	1531.69	23.38	18	0.486	0.624
60.0	59.6	21.958	35.580	24 674	328.00	2.229	1528.28	21.94	12	0.262	0.227
70 0	69.5	21.328	35.643	24.895	307.36	2.547	1526.95	21.31	20	0.187	0 199
80.0	79.4	20.879	35.693	25.056	292.36	2.846	1526.05	20.86	15	0.056	0 051
90.0	89.4	20.601	35.673	25.116	286.96	3.136	1525.41	20.58	19	0.122	0.139
100.0	99.3	20.077	35.657	25.244	275.12	3.417	1524.05	20.06	17	0.163	0.179
120.0	119.2	19.020	35.695	25.549	246.72	3 936	1521.52	19.00	20	0.102	0 084
140.0	139.0	18.639	35.717	25.662	236.55	4.419	1520.85	18.61	18	0.022	0.023
160.0	158.9	18.364	35.704	25.722	231.53	4.888	1520.34	18.34	14	0 032	0 032
180.0	178.7	18.100	35.701	25.785	226.13	5.346	1519.90	18 07	19	0.031	0.042
200.0	198.6	17.819	35.676	25.835	221.92	5.793	1519.41	17.78	22	0.055	0.053
220.0	218.4	17.582	35.582	25.898	216.56	6.232	1519.06	17.54	16	0.007	0.006
240.0	238.2	17.338	35.637	25.923	214.78	6.664	1518 63	17.30	20	0.039	0 056
260.0	258.1	16.774	35.550	25.991	208.73	7.088	1517.14	16.73	21	0.091	0.131
280.0	277.9	16.272	35.517	26.083	200.45	7.495	1515.95	16.23	16	0.053	0.055
300.0	297.8	15.864	35.479	26.148	194.76	7.891	1514.95	15.82	17	0.037	0.048
320.0	317.6	15.472	35.429	26.198	190.43	8.277	1514.02	15.42	20	0.047	0 045
340.0	337.4	15.051	35.388	26.261	184.89	8.653	1513.01	15.00	17	0.064	0 055
360.0	357.3	14.550	35.319	26.317	179.88	9.018	1511.55	14.50	19	0.103	0 089
380.0	377.1	14.198	35.331	26.402	172.18	9.367	1510.81	14.14	16	0.091	0 107
400.0	396.9	13.629	35.265	26.470	165.93	9.705	1509.18	13.57	19	0.106	0.117
420.0	416.7	13.199	35.238	26.537	159.81	10.029	1508.13	13.14	15	0 027	0 033
440.0	436.6	12.835	35.183	26.568	157.14	10.347	1507.19	12.77	21	0 055	0 041
460.0	456.4	12.361	35.093	26.592	155.04	10.659	1505.73	12 30	18	0.088	0.100
480.0	476.2	11.866	35.048	26.653	149.40	10.962	1504.40	11.80	15	0.066	0.070
500.0	496.0	11.469	35.016	26.702	144.87	11.256	1503.37	11.40	20	0.042	0 046
550.0	545.6	10.483	34.885	26.779	137.84	11.963	1500.58	10.42	17	0.049	0 055
600.0	595.1	9.641	34.779	26.841	132.11	12.634	1498.25	9.57	16	0.068	0 072
700.0	694.1	8.470	34.674	26.947	122.53	13.899	1495.47	8.40	17	0.012	0 032
800.0	793.1	7.149	34.573	27.062	111.29	15.078	1492.01	7 07	18	0 020	0 014
900.0	892.0	6.280	34.520	27.137	104.11	16.163	1490.15	6 20	18	0.033	0 021
1000.0	990.9	5.524	34.512	27.227	95.43	17.159	1488 78	5 44	17	0 019	0 019
1100.0	1089.7	4.935	34.527	27.308	87.58	18.079	1488 09	4.84	19	0 010	0 009
1200.0	1188.5	4.411	34.545	27.381	80.44	18.921	1487.58	4 31	19	0.031	0 024
1300 0	1287.2	4.014	34.574	27.446	74.15	19.689	1487 64	3 91	18	0 010	0 005
1400.0	1385.9	3.591	34.599	27.508	67.84	20 399	1487.54	3 19	22	0.018	0 013
1410.0	1395.8	3.543	34.608	27.521	66.60	20.466	1487.46	3.44	53	0.003	0.001



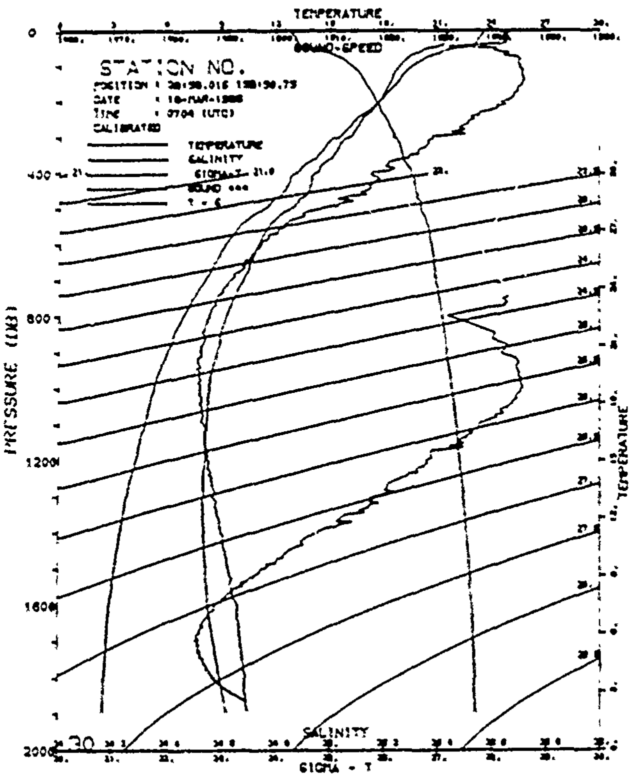


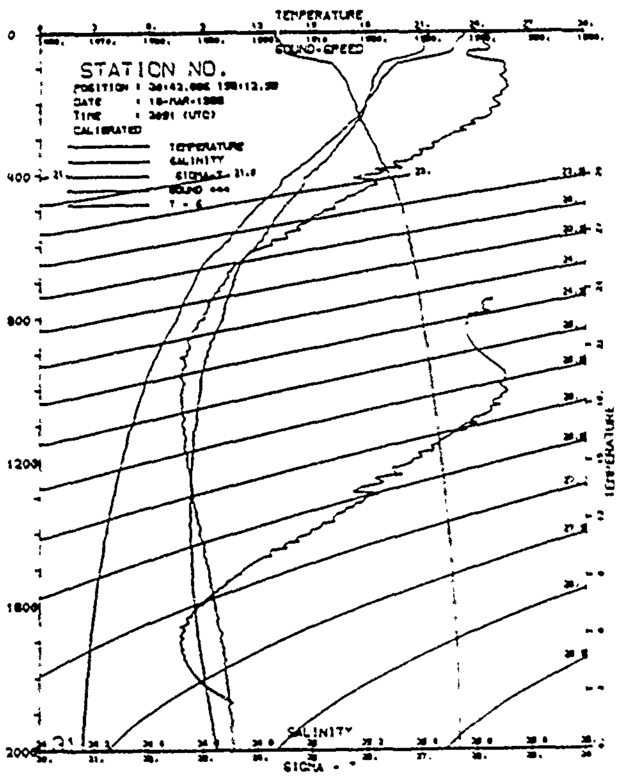
SHIP : HMAS COOK - Plessey
STATION NUMBER : 30 (THROUGH THE CRUISE)
STATION NUMBER : 30 (THROUGH THE YEAR)
DATE : 18-MAR-1986 (DAY NUMBER 77)
START TIME : 0704 GMT - Z
CRUISE : C001/86
POSITION : 29:50.01S 159:50.79E
CAST DEPTH : 1877 METRES
BOTTOM DEPTH : 2038 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
0.0	0.0	23.521	35.661	24.285	362.90	0.000	1531.69	23.52	7	0.002	0.003
10.0	9.9	23.475	35.650	24.290	362.76	0.363	1531.66	23.47	16	0.056	0.076
20.0	19.9	23.282	35.660	24.354	357.09	0.723	1531.32	23.28	17	0.026	0.021
30.0	29.8	23.157	35.647	24.381	354.89	1.079	1531.18	23.15	17	0.052	0.052
40.0	39.7	23.042	35.629	24.400	353.45	1.433	1531.01	23.03	18	0.065	0.096
50.0	49.7	22.075	35.517	24.592	335.52	1.777	1528.43	22.06	17	0.503	0.463
60.0	59.6	21.313	35.634	24.892	307.23	2.099	1526.78	21.30	19	0.189	0.179
70.0	69.5	20.735	35.640	25.055	292.39	2.398	1525.38	20.72	18	0.228	0.228
80.0	79.4	20.251	35.699	25.230	275.77	2.682	1524.29	20.24	18	0.100	0.092
90.0	89.4	19.941	35.693	25.307	268.71	2.955	1523.59	19.92	20	0.105	0.108
100.0	99.3	19.642	35.702	25.393	260.92	3.219	1522.94	19.62	16	0.077	0.076
120.0	119.1	19.141	35.706	25.526	248.91	3.729	1521.88	19.12	20	0.059	0.056
140.0	139.0	18.832	35.723	25.611	241.46	4.219	1521.33	18.81	18	0.053	0.058
160.0	158.8	18.478	35.698	25.689	234.66	4.695	1520.62	18.45	21	0.061	0.067
180.0	178.7	18.079	35.681	25.775	227.05	5.156	1519.78	18.05	20	0.069	0.073
200.0	198.5	17.727	35.645	25.835	221.96	5.604	1519.04	17.59	18	0.067	0.088
220.0	218.4	17.248	35.616	25.929	213.53	6.039	1517.94	17.21	18	0.051	0.049
240.0	238.2	16.695	35.535	25.998	207.43	6.461	1516.50	16.66	19	0.076	0.087
260.0	258.1	16.241	35.508	26.084	199.81	6.868	1515.43	16.20	18	0.045	0.026
280.0	277.9	15.914	35.484	26.140	194.90	7.264	1514.73	15.87	21	0.033	0.033
300.0	297.7	15.429	35.401	26.186	190.92	7.649	1513.44	15.38	23	0.216	0.264
320.0	317.6	14.835	35.360	26.286	181.78	8.020	1511.84	14.79	19	0.032	0.031
340.0	337.4	14.549	35.318	26.317	179.31	8.381	1511.21	14.50	18	0.053	0.059
360.0	357.2	14.205	35.283	26.363	175.29	8.735	1510.38	14.15	19	0.061	0.093
380.0	377.1	13.540	35.199	26.438	168.40	9.079	1508.42	13.49	16	0.066	0.083
400.0	396.9	13.148	35.177	26.501	162.73	9.407	1507.45	13.09	20	0.117	0.140
420.0	416.7	12.780	35.176	26.574	156.08	9.726	1506.62	12.72	20	0.004	0.010
440.0	436.5	12.597	35.145	26.586	155.25	10.038	1506.28	12.54	21	0.031	0.027
460.0	456.4	12.324	35.113	26.614	152.90	10.347	1505.61	12.26	20	0.055	0.025
480.0	476.2	11.793	35.069	26.683	146.51	10.650	1504.13	11.73	18	0.019	0.039
500.0	496.0	11.350	34.969	26.686	146.32	10.943	1502.75	11.30	17	0.113	0.133
550.0	545.5	9.971	34.833	26.827	132.74	11.639	1498.60	9.91	18	0.027	0.028
600.0	595.1	9.208	34.742	26.883	127.59	12.292	1496.58	9.14	19	0.035	0.029
700.0	694.1	8.097	34.633	26.972	119.66	13.529	1493.96	8.02	18	0.031	0.037
800.0	793.0	6.886	34.595	27.084	108.81	14.672	1490.87	6.81	20	0.023	0.017
900.0	891.9	6.070	34.524	27.168	100.86	15.721	1489.27	5.99	17	0.022	0.022
1000.0	990.8	5.295	34.517	27.258	92.04	16.683	1487.78	5.21	19	0.007	0.007
1100.0	1089.6	4.745	34.530	27.332	84.90	17.569	1487.24	4.65	19	0.009	0.007
1200.0	1188.4	4.289	34.548	27.396	78.66	18.386	1487.02	4.19	18	0.027	0.015
1300.0	1287.1	3.812	34.565	27.459	72.29	19.136	1486.69	3.71	15	0.020	0.017
1400.0	1385.8	3.445	34.597	27.521	66.15	19.824	1486.81	3.34	20	0.020	0.015
1500.0	1484.5	3.121	34.622	27.572	61.07	20.458	1487.16	3.01	17	0.011	0.007
1600.0	1583.0	2.836	34.656	27.626	55.70	21.045	1487.64	2.72	16	0.027	0.004
1700.0	1681.6	2.702	34.666	27.645	53.95	21.593	1488.72	2.58	20	0.004	0.000
1800.0	1780.1	2.566	34.685	27.673	51.43	22.120	1489.87	2.44	19	0.004	0.003
1900.0	1878.5	2.501	34.694	27.685	50.53	22.632	1491.18	2.37	42	0.002	0.004

SHIP : HMAS COOK - Plessey
STATION NUMBER : 31 (THROUGH THE CRUISE)
STATION NUMBER : 31 (THROUGH THE YEAR)
DATE : 18-MAR-1986 (DAY NUMBER 77)
START TIME : 2051 GMT - Z
CRUISE : C001/86
POSITION : 30:42.66S 158:12.55E
CAST DEPTH : 3464 METRES
BOTTOM DEPTH : 3669 METRES

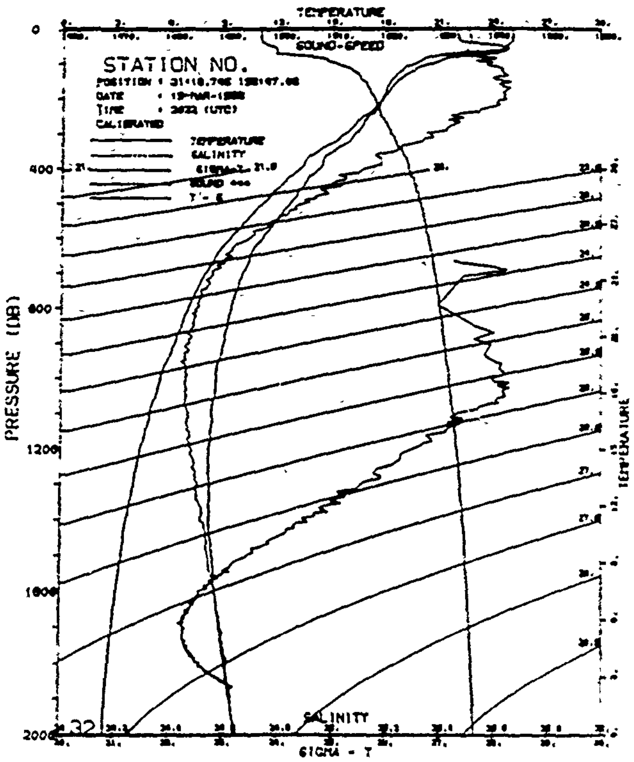
PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
0.0	0.0	23.428	35.656	24.309	360.62	0.000	1531.50	23.43	28	0.000	0.004
10.0	9.9	23.410	35.649	24.308	361.07	0.361	1531.48	23.41	20	0.030	0.064
20.0	19.9	23.191	35.621	24.351	357.32	0.720	1531.02	23.19	19	0.090	0.099
30.0	29.8	23.022	35.626	24.404	352.69	1.075	1530.81	23.02	19	0.051	0.066
40.0	39.7	22.836	35.640	24.468	346.95	1.425	1530.48	22.83	16	0.021	0.010
50.0	49.7	22.811	35.649	24.482	345.99	1.771	1530.60	22.80	19	0.009	0.013
60.0	59.6	22.586	35.601	24.516	343.66	2.116	1530.01	22.57	18	0.185	0.228
70.0	69.5	21.761	35.561	24.712	324.74	2.450	1527.90	21.75	18	0.308	0.304
80.0	79.4	20.562	35.629	25.093	288.83	2.757	1524.96	20.55	40	0.347	0.334
90.0	89.4	19.710	35.697	25.369	262.86	3.033	1523.00	19.70	21	0.072	0.046
100.0	99.3	19.514	35.706	25.429	257.43	3.293	1522.58	19.50	16	0.072	0.073
120.0	119.1	19.150	35.708	25.523	249.18	3.799	1521.96	19.14	21	0.053	0.069
140.0	139.0	18.780	35.708	25.620	240.62	4.289	1521.15	18.75	17	0.028	0.022
160.0	158.8	18.616	35.717	25.668	236.64	4.766	1521.07	18.59	18	0.026	0.032
180.0	178.7	18.329	35.695	25.723	232.02	5.236	1520.53	18.30	16	0.038	0.048
200.0	198.5	17.964	35.668	25.794	225.92	5.695	1519.80	17.93	15	0.026	0.016
220.0	218.4	17.833	35.660	25.820	224.09	6.144	1519.69	17.80	17	0.045	0.059
240.0	238.2	17.541	35.647	25.881	218.82	6.586	1519.17	17.50	15	0.052	0.049
260.0	258.1	17.038	35.580	25.952	212.61	7.019	1517.93	16.99	18	0.064	0.066
280.0	277.9	16.655	35.550	26.019	206.70	7.438	1517.05	16.61	17	0.040	0.028
300.0	297.7	16.195	35.489	26.080	201.39	7.848	1515.91	16.15	18	0.069	0.070
320.0	317.6	15.714	35.441	26.153	194.82	8.244	1514.71	15.66	19	0.073	0.060
340.0	337.4	15.314	35.392	26.206	190.22	8.628	1513.72	15.26	18	0.075	0.069
360.0	357.2	14.951	35.365	26.265	184.98	9.003	1512.90	14.90	19	0.050	0.061
380.0	377.0	14.340	35.325	26.367	175.60	9.366	1511.25	14.28	18	0.039	0.036
400.0	396.9	13.836	35.255	26.419	170.86	9.716	1509.88	13.78	21	0.045	0.056
420.0	416.7	13.303	35.205	26.491	164.29	10.056	1508.37	13.24	17	0.016	0.025
440.0	436.5	13.113	35.205	26.530	160.98	10.380	1508.08	13.05	19	0.067	0.065
460.0	456.3	12.671	35.152	26.577	156.74	10.697	1506.87	12.61	17	0.071	0.070
480.0	476.2	12.208	35.096	26.625	152.34	11.006	1505.57	12.14	18	0.077	0.081
500.0	496.0	11.827	35.063	26.672	148.04	11.305	1504.55	11.76	17	0.035	0.059
550.0	545.5	10.875	34.937	26.749	140.99	12.027	1501.96	10.81	17	0.072	0.065
600.0	595.0	10.048	34.844	26.823	134.27	12.717	1499.73	9.98	18	0.034	0.040
700.0	694.0	8.493	34.674	26.943	122.90	13.998	1495.47	8.42	22	0.031	0.028
800.0	793.0	7.552	34.600	27.026	115.36	15.189	1493.52	7.47	18	0.017	0.013
900.0	891.9	6.481	34.541	27.128	105.39	16.296	1490.85	6.40	18	0.014	0.011
1000.0	990.8	5.731	34.517	27.205	97.89	17.308	1489.58	5.64	16	0.014	0.012
1100.0	1089.6	5.073	34.517	27.284	90.16	18.246	1488.55	4.98	18	0.029	0.024
1200.0	1188.3	4.522	34.536	27.362	82.52	19.104	1487.93	4.42	18	0.018	0.012
1300.0	1287.1	4.054	34.559	27.430	75.78	19.892	1487.68	3.95	16	0.014	0.010
1400.0	1385.7	3.654	34.582	27.489	69.87	20.616	1487.66	3.55	17	0.016	0.015
1500.0	1484.4	3.288	34.613	27.549	63.78	21.283	1487.87	3.18	18	0.009	0.006
1600.0	1582.9	3.019	34.637	27.594	59.35	21.897	1488.41	2.90	18	0.008	0.006
1700.0	1681.5	2.793	34.660	27.632	55.52	22.469	1489.20	2.67	21	0.004	0.004
1800.0	1780.0	2.626	34.679	27.663	52.61	23.008	1490.19	2.50	18	0.007	0.005
1900.0	1878.4	2.500	34.696	27.687	50.37	23.524	1491.25	2.36	19	0.004	0.001
2000.0	1976.8	2.406	34.710	27.706	48.66	24.020	1492.57	2.26	20	0.004	0.000
2100.0	2075.2	2.326	34.720	27.721	47.45	24.499	1493.90	2.18	18	0.005	0.004
2200.0	2173.5	2.233	34.733	27.739	45.75	24.963	1495.18	2.08	17	0.005	0.003
2300.0	2271.8	2.160	34.746	27.755	44.35	25.411	1496.57	1.99	18	0.002	0.004
2400.0	2370.0	2.069	34.755	27.770	42.90	25.847	1497.89	1.90	19	0.006	0.004
2500.0	2468.1	1.979	34.764	27.784	41.49	26.268	1499.20	1.80	19	0.004	0.002
2600.0	2566.3	1.903	34.771	27.796	40.41	26.679	1500.53	1.71	20	0.003	0.003
2700.0	2664.4	1.816	34.767	27.800	39.86	27.081	1501.84	1.62	18	0.003	0.003
2800.0	2762.4	1.707	34.773	27.813	38.32	27.471	1503.11	1.50	18	0.006	0.004
2900.0	2860.4	1.586	34.772	27.821	37.08	27.848	1504.37	1.38	19	0.004	0.005
3000.0	2958.3	1.501	34.775	27.830	35.99	28.211	1505.68	1.28	17	0.000	0.003
3100.0	3056.3	1.421	34.773	27.834	35.28	28.570	1506.97	1.20	18	0.004	0.001
3200.0	3154.1	1.369	34.771	27.836	34.98	28.919	1508.48	1.14	23	0.004	0.000
3300.0	3251.9	1.314	34.773	27.841	34.13	29.266	1510.06	1.07	18	0.004	0.001
3400.0	3349.7	1.259	34.772	27.845	33.81	29.609	1511.47	1.01	20	0.004	0.002
3500.0	3447.4	1.227	34.771	27.846	33.67	29.948	1512.95	0.97	19	0.005	0.003
3520.0	3467.0	1.215	34.771	27.847	33.55	30.015	1513.25	0.95	97	0.004	0.005

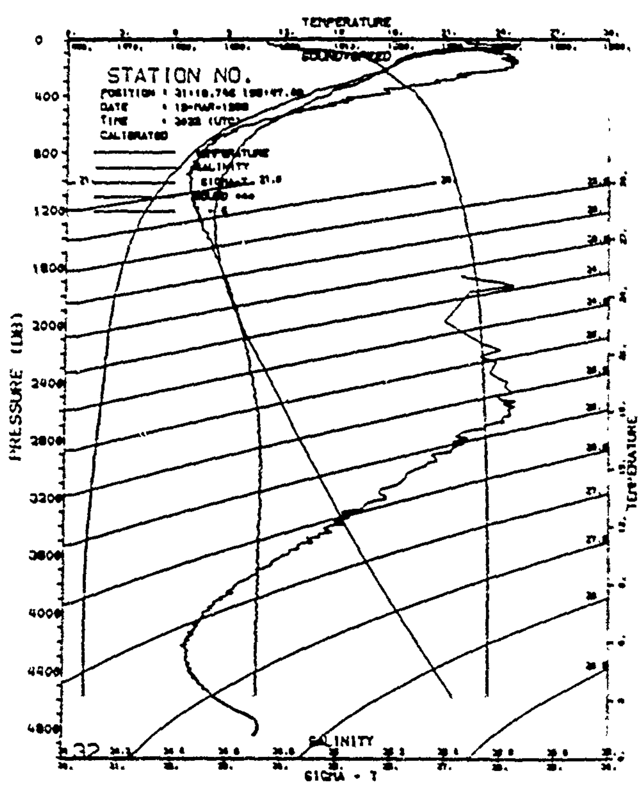


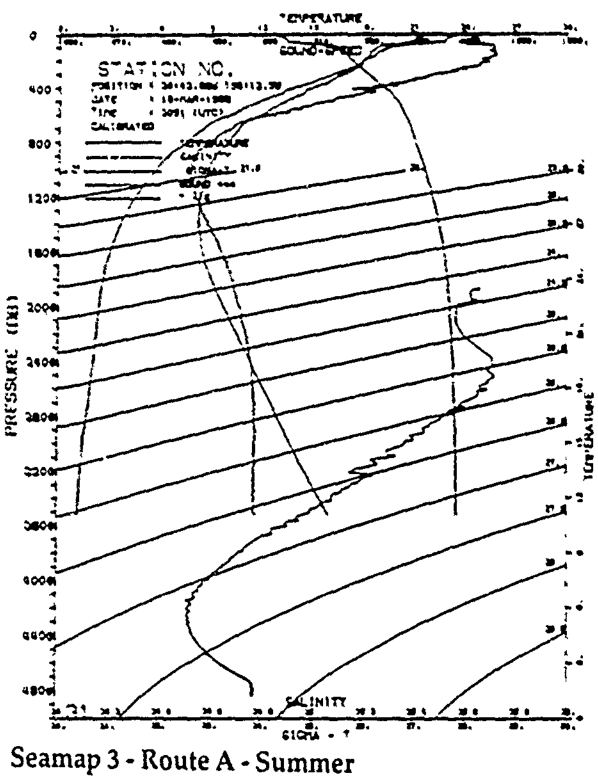


SHIP : HMAS COOK - Plessey
STATION NUMBER : 32 (THROUGH THE CRUISE)
STATION NUMBER : 32 (THROUGH THE YEAR)
DATE : 19-MAR-1986 (DAY NUMBER 78)
START TIME : 2022 GMT = Z
CRUISE : CR01/86
POSITION : 31:18.745 156:47.08E
CAST DEPTH : 4487 METRES
BOTTOM DEPTH : 4627 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
0.0	0.0	25 045	35.455	23 673	421.20	0 000	1535.26	25.04	9	0.002	0.002
10.0	9.9	25 046	35.458	23.675	421.44	0.421	1535.41	25.04	26	0.002	0.005
20.0	19.9	25.046	35.463	23.679	421.49	0.843	1535.57	25.04	25	0.001	0.007
30.0	29.8	25 047	35 466	23.681	421.63	1.264	1535.74	25.04	19	0.002	0.003
40.0	39.7	24.991	35.474	23.704	419.81	1.685	1535.73	24.98	21	0.071	0.052
50 0	49.6	24.729	35.591	23 872	404.22	2.097	1535.38	24.72	22	0.077	0.040
60.0	59.6	24.559	35.650	23.968	395.40	2.497	1535.18	24.55	16	0.019	0.012
70.0	69.5	24.375	35.567	23.960	396.55	2.893	1534.80	24.36	21	0.203	0.336
80 0	79.4	22.359	35.433	24.447	350.45	3.266	1529.47	22.34	19	0.613	0.515
90.0	89.4	21.241	35.574	24.867	310.75	3.597	1527.04	21.22	23	0.110	0.130
100.0	99.3	20 664	35.570	25.020	296.45	3.901	1525.57	20 65	17	0.136	0.121
120.0	119.1	19.534	35.626	25.363	264.38	4.460	1522.91	19.51	22	0.093	0.098
140.0	139.0	18.945	35.628	25.516	250.46	4.973	1521.61	18.92	17	0.081	0.116
160.0	158.8	18.476	35.635	25.641	239.19	5.463	1520.59	18.45	18	0.071	0.097
180.0	178.7	18.203	35.647	25.719	232.43	5.933	1520.13	18.17	22	0.051	0.050
200.0	198.5	17.856	35.642	25.800	225.27	6.391	1519.46	17.82	24	0.033	0.021
220.0	218.4	17.515	35.612	25.861	220.05	6 837	1518.75	17.48	19	0.038	0.026
240.0	238.2	17.138	35.533	25.892	217.67	7.276	1517.85	17.10	23	0.064	0.100
260.0	258.0	16.537	35.448	25.968	210.82	7.706	1516.28	16.49	19	0.197	0.147
280.0	277.9	16.208	35.441	26.040	204.51	8.120	1515.56	16.16	21	0.064	0.070
300.0	297.7	15.747	35.374	26.094	199.82	8.523	1514.37	15.70	16	0.116	0.132
320.0	317.5	15.258	35.341	26.178	192.18	8.913	1513.21	15.21	15	0.077	0.076
340.0	337.4	14.624	35.252	26 249	185.74	9.292	1511.31	14.57	26	0.136	0.130
360.0	357.2	13.988	35.175	26.326	178.67	9.654	1509.50	13.94	13	0.119	0.140
380.0	377.0	13.566	35.181	26.418	170.26	10.001	1508.57	13.51	13	0.041	0.050
400.0	396.9	13.274	35.131	26.440	168.56	10.340	1507.81	13.22	13	0.077	0.100
420.0	416.7	12.722	35.048	26.487	164.25	10 672	1506.18	12.66	14	0.127	0.150
440.0	436.5	12.312	35.008	26.536	159.82	10.993	1505.14	12.25	17	0.059	0.060
460.0	456.3	11.942	34.965	26.573	156.46	11.308	1504.15	11.88	15	0.101	0.111
480.0	476.1	11.575	34.942	26.625	151.74	11.613	1503.31	11.51	13	0.072	0.071
500.0	495.9	11.106	34.910	26.672	147.45	11.914	1502.20	11.12	16	0.034	0.036
550.0	545.5	10.261	34.785	26.740	141.24	12.636	1499.61	10.20	15	0.058	0.064
600.0	595.0	9.426	34.698	26.813	134.45	13.325	1497.33	9.36	16	0.043	0.063
700.0	694.0	8.001	34.561	26.929	123.49	14.611	1493.54	7.93	16	0.044	0.036
800.0	792.9	7.071	34.503	27.017	115.33	15.804	1491.56	6.99	17	0.020	0.023
900.0	891.8	6.288	34.471	27.098	107.80	16.918	1490.11	6.21	15	0.024	0.021
1000.0	990.7	5.536	34.459	27.183	99.53	17.954	1488.76	5.45	15	0.010	0.007
1100.0	1089.5	4.933	34.468	27.261	91.93	18.916	1487.96	4.84	15	0.009	0.009
1200.0	1188.3	4.413	34.483	27.331	85.06	19.808	1487.51	4.32	14	0.013	0.011
1300.0	1287.0	4.032	34.505	27.389	79.46	20.630	1487.62	3.93	14	0.004	0 002
1400.0	1385.7	3.629	34.518	27.440	74.27	21.400	1487.54	3.52	14	0.018	0.016
1500.0	1484.3	3.367	34.546	27.488	69.66	22.115	1488.16	3.25	16	0.009	0.004
1600.0	1582.9	3.105	34.570	27.532	65.35	22.791	1488.67	2.99	15	0.007	0.007
1700.0	1681.4	2.888	34.590	27.568	61.78	23.426	1489.39	2.76	18	0.011	0.009
1800.0	1779.9	2.696	34.612	27.603	58.35	24.025	1490.39	2.57	19	0.005	0.004
1900.0	1878.3	2.556	34.631	27.630	55.77	24.596	1491.37	2.42	18	0.004	0.005
2000.0	1976.7	2.448	34.642	27.648	54.20	25.146	1492.67	2.30	17	0.007	0.004
2100.0	2075.1	2.351	34.659	27.670	52.15	25.677	1493.97	2.20	16	0.000	0.002
2200.0	2173.4	2.277	34.668	27.684	51.03	26.192	1495.35	2.12	15	0.004	0.004
2300.0	2271.6	2.219	34.680	27.692	49.91	26.693	1496.78	2.05	18	0.002	0.000
2400.0	2369.9	2.138	34.690	27.712	48.54	27.183	1498.13	1.96	18	0.000	0.003
2500.0	2468.0	2.065	34.699	27.726	47.32	27.661	1499.55	1.88	19	0.006	0.002
2600.0	2566.1	1.978	34.707	27.739	46.00	28.126	1500.88	1.79	14	0.004	0 000
2700.0	2664.2	1.882	34.715	27.752	44.54	28.578	1502.16	1.68	17	0.005	0 002
2800.0	2762.3	1.791	34.717	27 761	43.49	29 019	1503.46	1 59	20	0.004	0.002
2900.0	2860.3	1.708	34.719	27 769	42.57	29.449	1504.91	1.50	19	0.005	0.002
3000.0	2958.2	1.657	34.720	27.774	42.09	29.871	1506.30	1.44	16	0.004	0 001
3100.0	3056.1	1.564	34.721	27.781	41.07	30.287	1507.62	1.34	21	0.004	0 002
3200.0	3154 0	1.489	34.718	27.785	40.47	30.695	1508.97	1.25	24	0.003	0.001
3300.0	3251 8	1.436	34.716	27.787	40.13	31.097	1510.47	1.19	19	0.005	0.002
3400 0	3349.6	1.368	34.715	27.791	39.51	31.494	1511.91	1.11	16	0 001	0 004
3500 0	3447.3	1.317	34.712	27.793	39.16	31.886	1513.41	1.05	21	0 003	0 004
3600.0	3545.0	1.260	34.714	27.798	38.45	32.274	1514.88	0.99	19	0.004	0 003
3700.0	3642.6	1.234	34.714	27.799	38.30	32.658	1516.47	0.95	19	0 003	0 003
3800.0	3740.2	1.214	34.714	27.801	38.19	33.042	1518.14	0.92	17	0.003	0.004
3900.0	3837.8	1.204	34.713	27.801	38.34	33.427	1519.82	0.90	22	0.003	0 000
4000 0	3935.3	1.186	34.711	27.800	38.42	33 812	1521.45	0.88	22	0.004	0 001
4100.0	4032.7	1.180	34.705	27.796	38.92	34.198	1523.23	0.86	19	0.003	0 004
4200.0	4130.2	1.176	34.711	27.801	38.65	34.586	1524.95	0.84	21	0.003	0.003
4300.0	4227.5	1.181	34.704	27 796	39.37	34.977	1526.70	0.84	20	0.002	0.001
4400.0	4324.9	1.184	34.708	27 798	39.40	35.370	1528.48	0 83	22	0.003	0.001
4500.0	4422 2	1.190	34.708	27 798	39 67	35.767	1530.23	0 82	21	0.003	0.001
4570.0	4490.3	1.192	34.705	27.795	40.08	36.046	1531.43	0.82	51	0.003	0.001



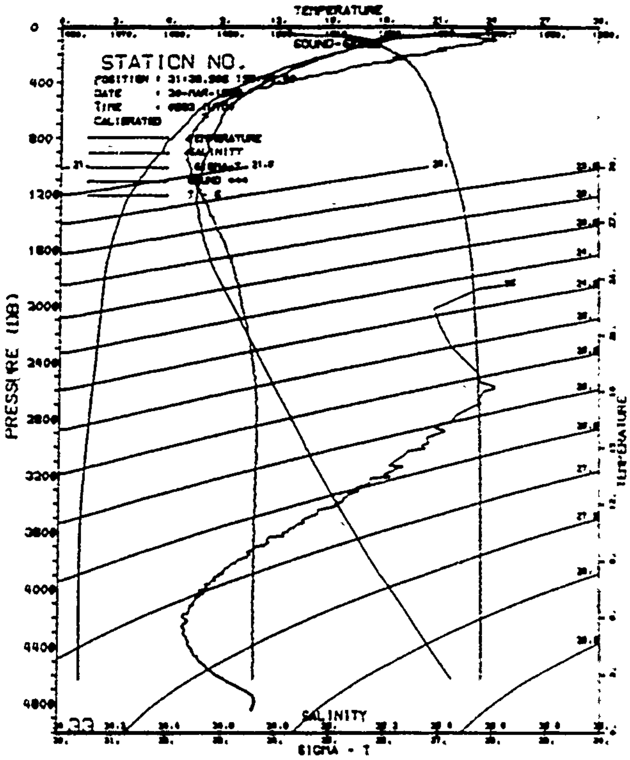


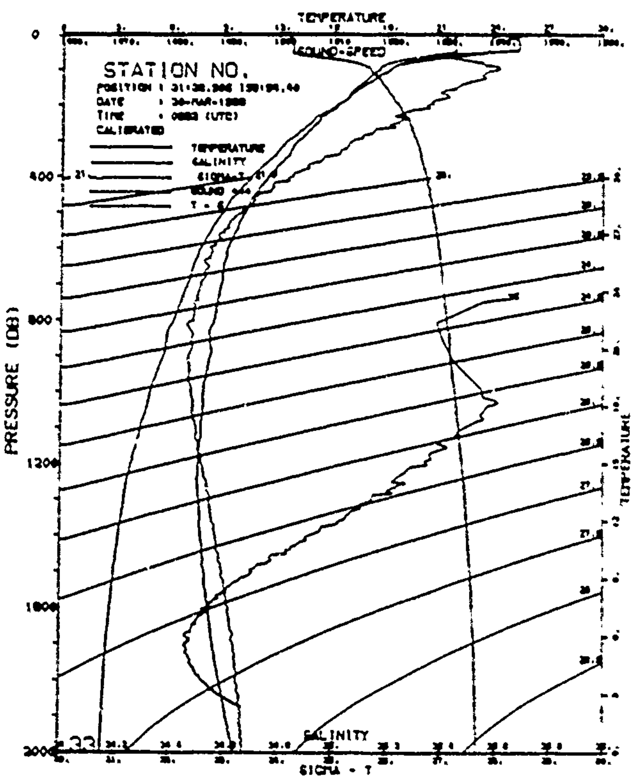


Seamap 3 - Route A - Summer

SHIP : HMAS COOK - Plessey
STATION NUMBER : 33 (THROUGH THE CRUISE)
STATION NUMBER : 33 (THROUGH THE YEAR)
DATE : 20-MAR-1986 (DAY NUMBER 79)
START TIME : 0932 GMT - Z
CRUISE : CK01/86
POSITION : 31:38.50S 155:54.40E
CAST DEPTH : 4546 METRES
BOTTOM DEPTH : 4764 METRES

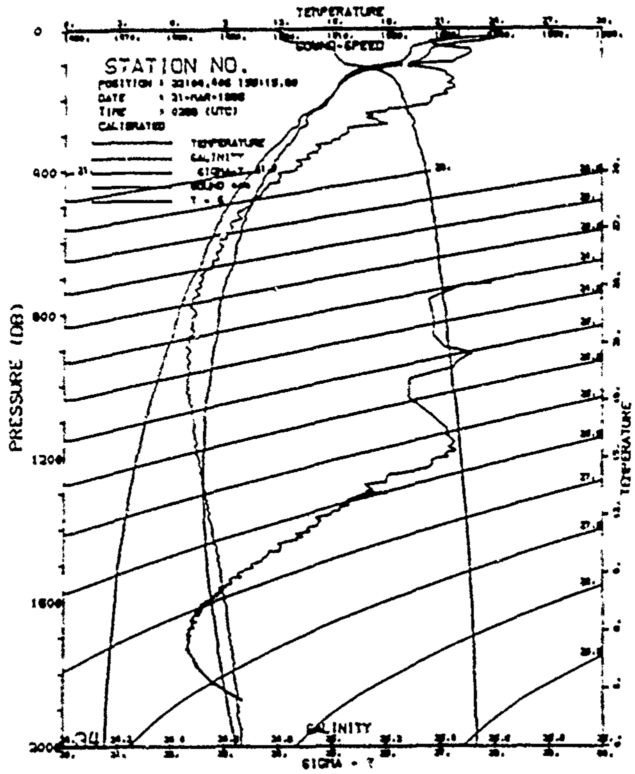
PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
0.0	0.0	23.893	35.690	24.197	371.23	0.000	1532.62	23.89	22	0.000	0.001
10.0	9.9	23.859	35.665	24.188	372.46	0.372	1532.46	23.86	15	0.051	0.074
20.0	19.9	23.722	35.685	24.244	367.58	0.742	1532.47	23.72	19	0.012	0.010
30.0	29.8	23.698	35.687	24.253	367.09	1.109	1532.56	23.69	18	0.005	0.003
40.0	39.7	23.689	35.688	24.256	367.18	1.476	1532.67	23.68	20	0.003	0.000
50.0	49 6	23.636	35 644	24.238	369.26	1.845	1532.58	23.63	20	0.073	0.154
60.0	59.6	22.323	35.425	24.452	349.24	2.204	1528.78	22.31	22	0.673	0.713
70.0	69.5	20.558	35.432	24.944	302.61	2.530	1524.19	20.54	17	0.441	0.409
80.0	79.4	19.374	35.339	25.323	266.81	2.814	1521.36	19.36	18	0.318	0.306
90 0	89.4	18.547	35.564	25.568	243.74	3.070	1519.36	18.53	18	0.177	0.171
100.0	99.3	18.193	35.615	25.696	231.92	3.308	1518.67	18.18	17	0.038	0.043
120.0	119.1	17.502	35.555	25.821	220.65	3.763	1516.87	17.48	20	0.093	0.095
140 0	139.0	16.886	35.494	25.922	211.60	4.194	1515.31	16.86	17	0.100	0.113
160.0	158.8	16.287	35.432	26.015	203.23	4.609	1513.72	16.26	21	0.067	0.092
180.0	178.7	15.837	35.416	26.106	195.14	5.008	1512.74	15.81	22	0.054	0.076
200.0	198.5	15.178	35.356	26.208	185.87	5.390	1510.87	15.15	22	0.068	0.080
220.0	218.4	14.591	35.267	26.268	180.54	5.756	1509.20	14.56	19	0.144	0.134
240.0	238.2	13.972	35.261	26.396	168.78	6.106	1507.66	13.94	20	0.025	0.029
260.0	258.0	13.540	35.211	26.447	164.32	6.440	1506.38	13.50	21	0.079	0.064
280.0	277.9	13.051	35.154	26.503	159.33	6.766	1505.18	13.01	20	0.041	0.074
300.0	297.7	12.488	35.069	26.549	155.22	7.081	1503.55	12.45	21	0.074	0.070
320.0	317.5	12.110	35.051	26.608	149.90	7.386	1502.56	12.07	22	0.040	0.040
340.0	337.4	11.831	35.016	26.634	147.72	7.684	1501.90	11.79	21	0.034	0.047
360.0	357.2	11.395	34.949	26.664	145.16	7.979	1500.63	11.35	21	0.063	0.080
380.0	377.0	10.963	34.902	26.706	141.32	8.266	1499.43	10.92	22	0.051	0.062
400.0	396.8	10.542	34.849	26.740	138.27	8.545	1498.20	10.49	22	0.048	0.045
420.0	416.7	10.183	34.789	26.756	136.88	8.820	1497.20	10.13	21	0.071	0.081
440.0	436.5	9.857	34.771	26.798	133.10	9.089	1496.37	9.81	22	0.036	0.035
460.0	456.3	9.469	34.709	26.814	131.64	9.355	1495.15	9.42	21	0.067	0.071
480.0	476.1	9.204	34.697	26.849	128.54	9.614	1494.53	9.15	20	0.021	0.024
500.0	495.9	8.954	34.661	26.861	127.54	9.870	1493.90	8.90	22	0.048	0.046
550.0	545.5	8.299	34.603	26.918	122.40	10.495	1492.33	8.24	19	0.026	0.034
600.0	595.0	7.691	34.548	26.964	118.12	11.095	1490.66	7.63	19	0.050	0.049
700.0	694.0	6.975	34.511	27.037	111.83	12.238	1489.56	6.91	21	0.023	0.022
800.0	792.9	6.238	34.481	27.112	105.02	13.321	1488.25	6.16	20	0.016	0.014
900.0	891.8	5.658	34.466	27.174	99.44	14.332	1487.56	5.58	21	0.027	0.024
1000.0	990.7	4.945	34.475	27.265	90.52	15.281	1486.35	4.86	22	0.022	0.019
1100.0	1089.5	4.396	34.497	27.344	82.83	16.152	1485.88	4.31	20	0.007	0.006
1200.0	1188.2	3.910	34.516	27.410	76.31	16.952	1485.39	3.82	22	0.025	0.016
1300.0	1287.0	3.529	34.545	27.472	70.28	17.680	1485.55	3.43	19	0.005	0.005
1400.0	1385.6	3.227	34.568	27.519	65.61	18.360	1485.85	3.13	20	0.010	0.006
1500.0	1484.3	2.962	34.593	27.564	61.27	18.997	1486.58	2.85	18	0.005	0.004
1600.0	1582.8	2.768	34.617	27.600	57.78	19.592	1487.39	2.65	20	0.004	0.004
1700.0	1681.4	2.591	34.636	27.631	54.75	20.156	1488.28	2.47	20	0.004	0.002
1800.0	1779.8	2.481	34.647	27.649	53.21	20.695	1489.50	2.35	22	0.003	0.002
1900 0	1878.3	2.391	34.664	27.670	51.35	21.217	1490.71	2.26	15	0.001	0.003
2000.0	1976.7	2.319	34 668	27.680	50.61	21.725	1492.16	2.18	20	0.002	0.000
2100.0	2075.0	2.226	34.687	27.703	48.57	22.222	1493.56	2.08	18	0.005	0.004
2200.0	2173.3	2.157	34.695	27.715	47.52	22.702	1494.86	2.00	20	0.004	0.001
2300.0	2271.6	2.077	34.705	27.729	46.27	23.170	1496.21	1.91	20	0.005	0.004
2400.0	2369.8	2.005	34.712	27.741	45.21	23.[illegible]	1497.54	1.83	19	0.003	0.000
2500.0	2468.0	1.926	34.719	27.752	44.07	24.073	1498.92	1.75	18	0.002	0.003
2600.0	2566.1	1.826	34.723	27.763	42.83	24.506	1500.25	1.64	20	0.002	0.001
2700 0	2664.2	1.754	34.727	27 772	41.92	24.928	1501.56	1.56	19	0 000	0 000
2800.0	2762.2	1.674	34.729	27 780	41.04	25.342	1502.89	1.47	19	0.005	0.000
2900.0	2860.2	1.595	34.729	27.786	40.29	25.749	1504.34	1.39	19	0 004	0 001
3000.0	2958.1	1.530	34.727	27 789	39.81	26.149	1505.63	1.31	18	0.002	0.001
3100.0	3056.0	1.459	34.728	27.795	39.09	26.543	1507.15	1.23	19	0.005	0.004
3200.0	3153.9	1.396	34.722	27.795	38.84	26.933	1508 61	1.16	12	0.003	0.003
3300.0	3251.7	1.329	34.721	27.799	38.23	27.317	1510.02	1.09	20	0 004	0 003
3400.0	3349.5	1.278	34.724	27.805	37.52	27 695	1511.55	1.03	19	0.000	0.004
3500.0	3447.2	1.242	34.722	27.806	37.37	28.070	1513.07	0 98	20	0.003	0.000
3600.0	3544.9	1.220	34.723	27.808	37.21	28.445	1514.67	0.95	17	0.004	0 004
3700.0	3642 5	1.198	34.718	27.806	37.42	28.818	1516.35	0 92	20	0.004	0.000
3800.0	3740.1	1.185	34.716	27.805	37.62	29.191	1518.01	0.90	20	0.003	0.003
3900.0	3837.7	1.178	34.717	27.806	37.61	29.566	1519.63	0.88	18	0.003	0.002
4000.0	3935.2	1.172	34.719	27.808	37.64	29.941	1521.51	0 86	19	0.003	0.003
4100.0	4032.6	1.169	34.716	27.806	37.98	30.318	1523.18	0 85	20	0.003	0.003
4200.0	4130 0	1.174	34.716	27 806	38.23	30 698	1524.90	0.84	20	0.002	0 001
4300.0	4227 4	1.176	34.721	27.809	38.14	31.080	1526.70	0.83	17	0.004	0.002
4400 0	4324.8	1.181	34.722	27.809	38.38	31.465	1528.46	0.83	17	0.003	0.003
4500 0	4422.1	1.184	34.722	27.810	38.58	31.851	1530.29	0 82	20	0.003	0.004
4600 0	4519.3	1.192	34.717	27 805	39.25	32.241	1532.06	0.81	19	0.003	0.001
4630.0	4548.5	1.194	34.718	27 806	39.30	32.358	1532.50	0 81	82	0.003	0.003

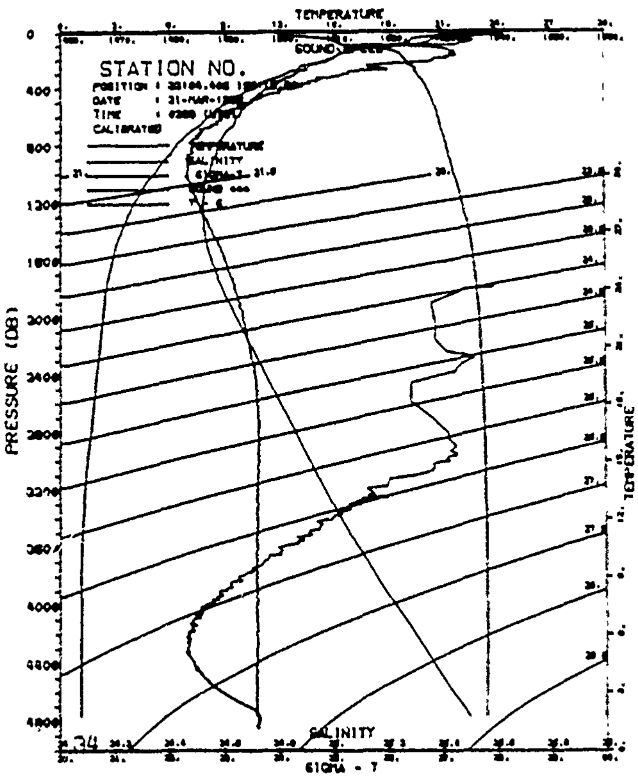




SHIP : HMAS COOK - Plessey
STATION NUMBER : 34 (THROUGH THE CRUISE)
STATION NUMBER : 34 (THROUGH THE YEAR)
DATE : 21-MAR-1986 (DAY NUMBER 80)
START TIME : 0233 GMT - Z
CRUISE : CK01/86
POSITION : 32:04.40S 155:15.00E
CAST DEPTH : 4681 METRES
BOTTOM DEPTH : 4753 METRES

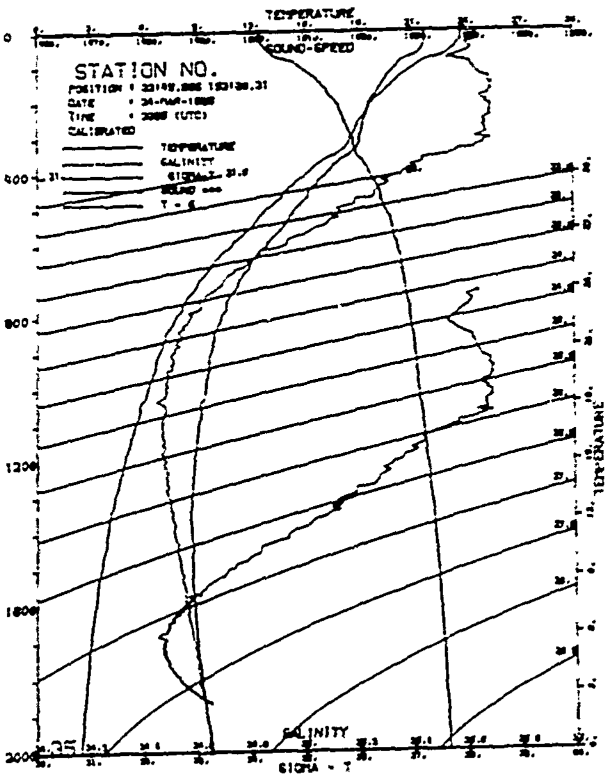
PRESS	DEPTH	TEMP	SAL	SIGMA T	SVA	G A.	Sound	Pot.Temp			
0.0	0 0	24.207	35.605	24.040	306.24	0.000	1533.14	24.21	1	0.000	0.000
10.0	9 9	24.223	35.595	24.027	307.87	0.307	1533.39	24.22	27	0.005	0.013
20.0	19.9	24.136	35.582	24.044	306 67	0.774	1533.38	24.13	20	0.020	0.016
30.0	29.8	23.949	35.493	24.032	308.17	1.162	1532.65	23.94	22	0.191	0.291
40.0	39.7	22.500	35.360	24.351	358.05	1.535	1528.01	22.49	23	0.549	0.524
50.0	49.6	21.177	35.381	24.737	321.62	1.875	1575.72	21.17	19	0.315	0.300
60.0	59.6	20.404	35.500	25 016	295.42	2.183	1574.42	20.47	24	0.052	0.019
70 0	69.5	20.411	35.514	25.046	292.93	2.477	1524.39	20.40	20	0.021	0.029
80.0	79.4	20.237	35.408	25.073	290.70	2.769	1523.90	20.22	21	0.074	0.085
90 0	89.4	19.953	35.469	25.133	285.29	3.057	1523.24	19.94	21	0.106	0.117
100.0	99.3	19.320	35.348	25.206	278.57	3.339	1521.19	19.30	20	0.371	0.403
120.0	119.1	16 810	35.411	25.876	215.25	3.835	1514.46	16.79	20	0.227	0.213
140.0	139.0	15.896	35.400	26.117	192.87	4.242	1512.25	15.87	21	0.083	0.072
160.0	158.8	15.429	35.443	26.219	183.68	4.619	1511.17	15.40	16	0.049	0.036
180.0	178.7	15.107	35.424	26.276	178.75	4.981	1510.50	15.08	19	0.068	0.064
200.0	198.5	14.750	35.368	26.312	175.89	5.336	1509.53	14.72	17	0.081	0.089
220.0	218.3	14.342	35.321	26.363	171.44	5.682	1508.56	14.31	18	0.094	0.119
240.0	238.2	13.536	35.142	26.394	168.72	6.025	1506.01	13.50	19	0.123	0.168
260.0	258.0	13.129	35.167	26.497	159.38	6.352	1505.11	13.09	20	0.012	0.027
280 0	277.9	12.822	35.067	26.481	161.29	6.670	1504.15	12.78	22	0.152	0.164
300.0	297.7	12.424	35.047	26.544	155.60	6.985	1503.31	12.38	20	0.043	0.059
320.0	317.5	12.075	35.000	26.576	152.94	7.294	1502.42	12.03	20	0.064	0.068
340.0	337.4	11.603	34.954	26.629	148.09	7.596	1501.05	11.56	18	0 056	0.062
360 0	357.2	11.213	34.914	26.670	144.43	7.889	1500.02	11.17	21	0.063	0.048
380 0	377.0	10 887	34 887	26.708	141.09	8.176	1499.18	10.84	19	0.029	0.026
400.0	396.8	10.664	34 862	26.729	139.41	8.457	1498.68	10.61	20	0.026	0.047
420.0	416.6	10.241	34.806	26.759	136.65	8.734	1497.38	10.19	19	0.038	0.034
440.0	436.5	10.003	34.765	26.769	135.98	9.006	1496.90	9.95	19	0.062	0.060
460.0	456.3	9.661	34.741	26.807	132.44	9.274	1496.03	9.61	20	0.044	0.039
480.0	476.1	9.415	34.708	26.823	131.17	9.537	1495.36	9.36	18	0.054	0 055
500.0	495.9	9.193	34.694	26.848	129.00	9.796	1494.87	9.14	22	0.037	0.042
550.0	545.4	8.574	34.623	26.890	125.25	10.432	1493.32	8.51	20	0.043	0 038
600.0	595.0	8.125	34.580	26.926	122.30	11.048	1492.40	8.06	19	0.041	0.036
700 0	693.9	7.199	34.522	27.016	114.20	12.233	1490.44	7.13	18	0.030	0 026
800.0	792.9	6.406	34.496	27.102	106.25	13.338	1489.00	6.33	16	0.002	0 003
900.0	891 8	5.736	34.474	27.171	99.91	14.379	1487.93	5 66	20	0.017	0.009
1000.0	990.6	5.166	34.465	27.232	94.14	15.351	1487.27	5.08	19	0.021	0.021
1100.0	1089.4	4.547	34.489	27.321	85.32	16.243	1486.45	4.46	18	0 010	0.010
1200.0	1188.2	4.083	34.507	27.386	79.07	17.070	1486.18	3.99	20	0.013	0.011
1300.0	1286.9	3.691	34.533	27.446	73.15	17 832	1486.24	3.59	20	0 009	0.008
1400.0	1385.6	3.349	34.560	27.501	67.73	18.537	1486.46	3.25	20	0.006	0.004
1500.0	1484.2	3.052	34.585	27.549	62.89	19.192	1486.85	2.94	20	0.007	0.007
1600.0	1582.8	2.850	34.603	27.582	59.79	19 804	1487.66	2.74	21	0.007	0.006
1700.0	1681.3	2 686	34.621	27.611	57.01	20.386	1488.72	2.56	18	0.009	0.006
1800.0	1779.8	2.541	34.641	27.639	54.37	20.940	1489.79	2.41	19	0 005	0.003
1900.0	1878.2	2.431	34.658	27.662	52.29	21.470	1490.98	2.30	18	0.001	0 003
2000.0	1976.6	2.330	34.671	27 681	50 57	21.984	1492.25	2.19	21	0.000	0.002
2100.0	2074.9	2.259	34 684	27.698	49.19	22.484	1493.63	2.11	20	0.002	0.001
2200.0	2173.2	2.189	34.693	27.710	48.13	22.970	1494.95	2.03	22	0.000	0.003
2300.0	2271.5	2.108	34.704	27.726	46.73	23.445	1496.39	1.94	22	0.003	0.004
2400.0	2369.7	2.014	34.715	27.742	45.09	23.903	1497 69	1.84	17	0.004	0 000
2500.0	2467.9	1.941	34.720	27.752	44.10	24.348	1498.99	1.76	20	0.005	0.001
2600 0	2566.0	1.851	34.722	27.761	43 21	24.785	1500.35	1 66	23	0 006	0 004
2700 0	2664.1	1.781	34.725	27 769	42.41	25 213	1501 72	1.59	20	0 005	0 003
2800.0	2762.1	1.707	34.725	27.774	41.79	25 632	1503.12	1.50	24	0 007	0 005
2900 0	2860.1	1.600	34.729	27.785	40.39	26.041	1504.34	1.39	18	0.004	0 004
3000.0	2958.0	1.515	34.730	27.792	39.41	26.440	1505.70	1.30	22	0 004	0 002
3100.0	3055.9	1.448	34.726	27.794	39.07	26.832	1507.12	1.22	19	0.006	0 004
3200.0	3153.8	1.384	34.724	27.797	38.57	27.219	1508 55	1.15	22	0 005	0 004
3300.0	3251.6	1.329	34.725	27.802	37.95	27.601	1510 05	1.09	20	0.002	0.003
3400.0	3349.3	1.273	34.723	27.804	37.56	27.980	1511 50	1.02	22	0 004	0 001
3500.0	3447.1	1.231	34.722	27.806	37.26	28.353	1513 04	0 97	19	0 003	0 000
3600 0	3544.7	1.204	34.724	27.809	36.91	28.724	1514.67	0 94	24	0 004	0 005
3700.0	3642.4	1.185	34.721	27.809	37.03	29 095	1516.31	0.91	25	0 004	0 002
3800.0	3740.0	1.173	34.722	27.811	36.98	29.466	1518 00	0 88	21	0 003	0 003
3900.0	3837.5	1.169	34.724	27.812	37.04	29 837	1519 68	0.87	21	0.003	0 002
4000.0	3935.0	1.167	34.721	27.810	37.37	30.209	1521.42	0 86	24	0 004	0 000
4100.0	4032.5	1.161	34.722	27.811	37.46	30.584	1523.16	0 84	19	0 003	0 000
4200.0	4129.9	1.164	34.722	27.811	37.69	30.960	1524.93	0 83	17	0 003	0 004
4300.0	4227.3	1.163	34.722	27.811	37.84	31.337	1526.66	0.82	19	0.004	0 002
4400.0	4324.6	1.166	34.722	27.811	38.10	31.716	1528.37	0 81	19	0 004	0 003
4500.0	4421.9	1.172	34.720	27.809	38.55	32.100	1530 19	0.81	21	0 003	0 003
4600.0	4519.2	1.177	34.720	27.808	38 81	32.485	1531.95	0.80	22	0.004	0 000
4700.0	4616.4	1.184	34.722	27.810	38.95	32 874	1533.75	0.80	25	0 002	0 001
4770.0	4684.4	1.177	34.721	27.810	39.04	33.147	1534.95	0.78	88	0 004	0.003

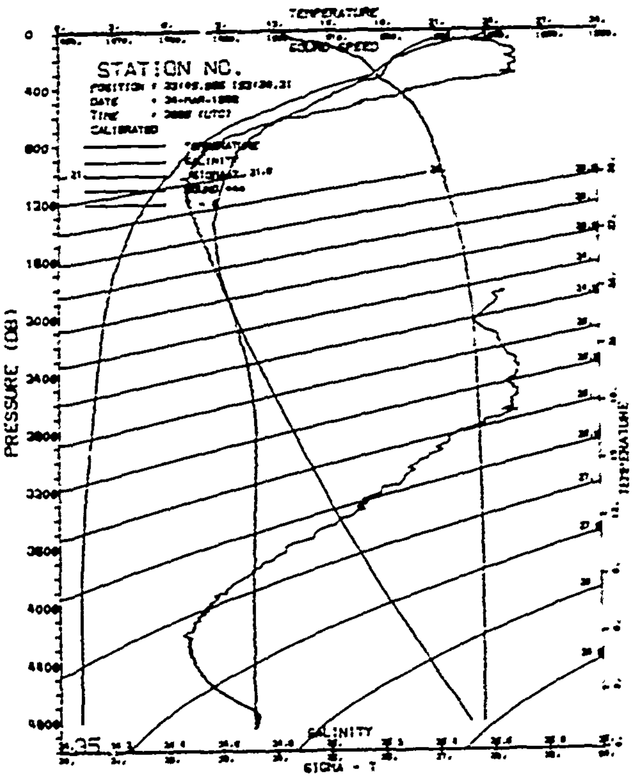




SHIP : [illegible]
STATION NUMBER : 35 [illegible]
STATION NUMBER : 35 [illegible]
DATE : 24-MAR-1986 [illegible]
START TIME : 2335 [illegible]
CRUISE : [illegible]
POSITION : 33:45.966 153:30.23E
CAST DEPTH : 4724 METRES
BOTTOM DEPTH : 4814 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
0.0	0.0	23.812	35.635	24.180	372.92	0.000	1532.46	23.80	7	0.090	0.085
10.0	9.9	23.805	35.641	24.186	372.66	0.373	1532.43	23.80	26	0.086	0.083
20.0	19.9	23.780	35.646	24.195	372.21	0.745	1532.50	23.78	19	0.085	0.083
30.0	29.8	23.755	35.636	24.190	373.10	1.110	1532.60	23.75	19	0.045	0.080
40.0	39.7	23.536	35.612	24.243	368.30	1.489	1532.23	23.53	22	0.043	0.043
50.0	49.6	23.390	35.625	24.286	363.79	1.855	1532.03	23.38	28	0.052	0.050
60.0	59.6	23.125	35.600	24.361	357.96	2.216	1531.46	23.11	20	0.079	0.078
70.0	69.5	22.765	35.571	24.436	351.13	2.570	1530.65	22.75	18	0.175	0.171
80.0	79.4	22.051	35.546	24.619	334.08	2.913	1528.07	22.04	18	0.263	0.252
90.0	89.1	21.510	35.428	24.828	315.18	3.237	1527.00	21.50	17	0.072	0.075
100.0	99.3	21.250	35.632	24.905	307.42	3.540	1527.29	21.24	18	0.060	0.062
120.0	119.1	20.635	35.653	25.092	290.37	4.147	1525.94	20.61	20	0.099	0.106
140.0	139.0	20.141	35.606	25.209	276.06	4.711	1524.96	20.12	17	0.089	0.073
160.0	158.8	19.559	35.609	25.370	264.40	5.251	1523.99	19.63	17	0.070	0.064
180.0	178.7	19.315	35.601	25.462	257.06	5.772	1523.31	19.28	17	0.057	0.072
200.0	198.5	18.825	35.603	25.589	245.59	6.275	1522.23	18.79	19	0.052	0.059
220.0	218.3	18.571	35.694	25.662	239.23	6.759	1521.90	18.53	19	0.044	0.041
240.0	238.2	18.346	35.691	25.717	234.60	7.233	1521.53	18.30	18	0.026	0.030
260.0	258.0	18.049	35.680	25.782	229.07	7.697	1521.07	18.00	18	0.022	0.018
280.0	277.8	17.835	35.674	25.830	225.03	8.151	1520.75	17.79	17	0.026	0.027
300.0	297.7	17.572	35.646	25.873	221.56	8.597	1520.20	17.52	15	0.064	0.067
320.0	317.5	17.428	35.660	25.919	217.76	9.034	1520.15	17.37	21	0.043	0.062
340.0	337.3	16.968	35.572	25.962	214.13	9.467	1519.00	16.91	20	0.062	0.062
360.0	357.2	16.238	35.447	26.038	207.20	9.889	1516.94	16.18	19	0.144	0.151
380.0	377.0	15.614	35.403	26.146	197.19	10.293	1515.33	15.55	21	0.081	0.064
400.0	396.8	15.151	35.364	26.221	190.48	10.680	1514.19	15.09	17	0.063	0.060
420.0	416.6	14.608	35.297	26.288	184.34	11.056	1512.65	14.54	18	0.091	0.090
440.0	436.4	14.164	35.276	26.367	177.13	11.417	1511.53	14.19	22	0.099	0.103
460.0	456.3	13.822	35.265	26.430	171.51	11.765	1510.81	13.76	19	0.021	0.025
480.0	476.1	13.426	35.191	26.455	169.34	12.107	1509.74	13.36	20	0.085	0.081
500.0	495.9	12.912	35.130	26.512	164.06	12.441	1508.30	12.84	18	0.077	0.068
550.0	545.4	12.047	35.059	26.627	153.69	13.229	1506.08	11.97	20	0.052	0.065
600.0	594.9	10.963	34.929	26.727	144.26	13.975	1503.11	10.89	20	0.030	0.044
700.0	693.9	9.133	34.702	26.864	131.22	15.353	1497.92	9.05	20	0.030	0.035
800.0	792.8	7.842	34.570	26.966	121.46	16.616	1494.60	7.76	20	0.028	0.024
900.0	891.7	6.899	34.510	27.047	113.78	17.788	1492.53	6.81	20	0.042	0.036
1000.0	990.6	6.280	34.489	27.111	107.68	18.892	1491.33	6.19	17	0.023	0.017
1100.0	1089.4	5.514	34.472	27.196	99.44	19.924	1490.28	5.42	17	0.025	0.017
1200.0	1188.1	4.928	34.488	27.270	91.39	20.877	1489.63	4.83	17	0.004	0.009
1300.0	1286.8	4.363	34.504	27.353	83.91	21.757	1488.94	4.26	19	0.014	0.010
1400.0	1385.5	3.983	34.520	27.406	78.58	22.565	1489.05	3.88	19	0.010	0.009
1500.0	1484.1	3.609	34.543	27.463	72.88	23.323	1489.17	3.49	19	0.013	0.010
1600.0	1582.7	3.300	34.571	27.515	67.69	24.025	1489.50	3.18	19	0.013	0.007
1700.0	1681.2	3.011	34.595	27.561	62.93	24.680	1490.02	2.89	18	0.007	0.005
1800.0	1779.7	2.825	34.608	27.588	60.28	25.294	1490.93	2.69	15	0.003	0.002
1900.0	1878.1	2.634	34.636	27.628	56.39	25.875	1491.83	2.50	20	0.001	0.003
2000.0	1976.5	2.495	34.651	27.651	53.96	26.426	1492.93	2.35	24	0.004	0.000
2100.0	2074.8	2.385	34.671	27.677	51.74	26.955	1494.16	2.23	19	0.005	0.003
2200.0	2173.1	2.280	34.686	27.697	49.89	27.465	1495.45	2.13	23	0.004	0.003
2300.0	2271.4	2.192	34.698	27.714	48.27	27.956	1496.71	2.03	18	0.005	0.002
2400.0	2369.6	2.118	34.709	27.729	46.94	28.430	1498.10	1.94	19	0.002	0.003
2500.0	2467.7	2.031	34.722	27.746	45.25	28.893	1499.45	1.85	18	0.005	0.002
2600.0	2565.8	1.943	34.725	27.755	44.43	29.344	1500.95	1.77	22	0.054	0.002
2700.0	2661.9	1.869	34.730	27.765	43.29	29.783	1502.26	1.63	22	[illegible]	0.002
2800.0	2761.9	1.792	34.732	27.771	42.40	30.214	1503.54	1.59	23	0.064	0.000
2900.0	2859.9	1.725	34.736	27.782	41.45	30.637	1504.80	1.50	22	0.063	0.002
3000.0	2957.8	1.611	34.729	27.783	41.22	31.052	1506.25	1.41	20	0.063	0.000
3100.0	3055.7	1.546	34.730	27.790	40.40	31.459	1507.43	1.34	27	0.085	0.002
3200.0	3153.6	1.482	34.727	27.792	39.84	31.860	1509.02	1.25	21	0.085	0.004
3300.0	3252.4	1.404	34.727	27.798	38.99	32.254	[illegible]	1.09	23	0.085	0.002
3400.0	3349.1	1.356	34.725	27.800	38.55	32.642	1511.72	1.22	29	0.063	0.000
3500.0	3446.9	1.305	34.724	27.803	38.20	33.027	1513.42	1.04	20	0.062	0.003
3600.0	3544.5	1.253	34.720	27.804	37.88	33.407	1514.91	0.98	22	0.062	0.002
3700.0	3642.2	1.229	34.720	27.806	37.60	33.784	1516.49	0.94	22	0.064	0.002
3800.0	3739.8	1.236	34.720	27.805	37.44	34.161	1518.02	0.92	20	0.063	0.003
3900.0	3837.3	1.208	34.720	27.808	37.40	34.536	1519.75	0.98	26	0.063	0.003
4000.0	3934.8	1.171	34.717	27.806	37.25	34.912	1521.51	0.86	23	0.073	0.002
4100.0	4032.2	1.152	34.726	27.816	32.91	35.270	1521.22	0.85	22	0.054	0.002
4200.0	4129.7	1.166	34.719	27.900	37.95	35.649	1524.95	0.81	19	0.063	0.004
4300.0	4227.0	1.143	34.729	27.820	37.93	36.040	1526.57	0.82	19	0.052	0.003
4400.0	4324.4	1.140	34.736	27.806	38.56	36.415	1528.45	0.83	20	0.061	0.004
4500.0	4421.6	1.152	34.717	27.807	38.72	36.817	1530.15	0.83	21	0.062	0.073
4600.0	4518.9	1.173	34.722	27.810	38.67	37.204	1531.79	0.80	22	0.061	0.002
4700.0	4616.1	1.172	34.722	27.811	38.77	37.591	1533.74	0.78	26	0.061	0.099
4800.0	4713.3	1.172	34.729	27.800	39.22	37.904	1535.49	0.77	41	0.061	0.071
4850.0	4723.0	1.170	34.727	27.806	39.32	38.024	1535.63	0.77	42	0.063	0.092





STATION 1 33.29S 152.45E SEAMAP3

DATE= 28/01/1986 TIME= 0332GMT DEPTH= 4842

	DEPTH	TEMP	SALINITY	SIGMA-T	A.S.V	OX	POT.TEMP	S.S
	m	°C	ppt		CL/T	ML/L	°C	M/Sec
CBS	32	22.790	35.363	24.423	321.0	0.00	22.78	1528.6
CBS	1213	2.780	34.389	27.418	72.4	0.00	2.69	1485.4
CBS	4217	1.130	34.700	27.790	39.6	0.00	.88	1538.0
CBS	4704	1.160	34.719	27.889	39.0	0.00	.76	1534.9

STATION 2 33.37S 153.43E SEAMAP 3

DATE= 29/01/86 TIME= 1640GMT DEPTH= 4882

	DEPTH	TEMP	SALINITY	SIGMA-T	A.S.V	OX	POT.TEMP	S.S
	m	°C	ppt		CL/T	ML/L	°C	M/Sec
CBS	36	23.050	35.477	24.285	364.5	0.00	23.04	1531.2
CBS	1633	2.640	34.601	27.639	54.1	0.00	2.52	1480.2

STATION 3 33.37S 154.15E SEAMAP 3

DATE= 30/01/1986 TIME= 2300GMT DEPTH= 4838

	DEPTH	TEMP	SALINITY	SIGMA-T	A.S.V	OX	POT.TEMP	S.S
	m	°C	ppt		CL/T	ML/L	°C	M/Sec
CBS	31	22.880	35.385	24.414	331.8	0.00	22.87	1530.9
CBS	1507	3.080	34.377	27.347	63.0	0.00	2.99	1487.1
CBS	4309	1.170	34.710	27.801	38.9	0.00	.83	1527.6
CBS	4734	1.160	34.717	27.807	39.2	0.00	.76	1533.5

STATION 4 33.30S 156.45E SEAMAP3

DATE= 31/01/1986 TIME= 2110GMT DEPTH= 4785

	DEPTH	TEMP	SALINITY	SIGMA-T	A.S.V	OX	POT.TEMP	S.S
	m	°C	ppt		CL/T	ML/L	°C	M/Sec
CBS	32	23.050	35.383	24.263	336.7	0.00	23.04	1531.3
CBS	1504	3.370	34.545	27.407	67.9	0.00	3.26	1488.6
CBS	4274	1.190	34.706	27.796	39.3	0.00	.84	1527.4
CBS	4692	1.210	34.710	27.790	40.4	0.00	.81	1534.9

STATION 5 33.85S 158.29E SEAMAP 3

DATE= 01/02/86 TIME= 2257GMT DEPTH= 3804

	DEPTH	TEMP	SALINITY	SIGMA-T	A.S.V	OX	POT TEMP	S.S
	m	°C	ppt		CL/T	ML/L	°C	M/Sec
CBS	32	22.870	35.379	24.412	332.0	0.00	22.86	1530.0
CBS	1504	3.320	34.549	27.495	69.8	0.00	3.21	1488.4
CBS	3401	1.290	34.713	27.796	38.7	0.00	1.02	1513.0
CBS	3800	1.290	34.701	27.792	39.6	0.00	.90	1519.0

STATION 6 33.39S 159.39E SEAMAP3

DATE= 01/02/1986 TIME= 0626GMT DEPTH= 1323

	DEPTH	TEMP	SALINITY	SIGMA-T	A.S.V	OX	POT.TEMP	S.S
	m	°C	ppt		CL/T	ML/L	°C	M/Sec
CBS	31	22.300	35.382	24.516	342.0	0.00	22.29	1529.5
CBS	384	10.430	34.850	26.763	138.3	0.00	10.36	1499.9
CBS	1190	4.460	34.480	27.324	83.9	0.00	4.36	1487.0

STATION 7 32.28S 160.04E SEAMAP3

DATE= 04/02/1986 TIME= 0300GMT DEPTH= 2986

	DEPTH	TEMP	SALINITY	SIGMA-T	A.S.V	OX	POT.TEMP	S.S
	m	°C	ppt		CL/T	ML/L	°C	M/Sec
CBS	28	22.930	35.375	24.392	333.8	0.00	22.92	1530.9
CBS	399	10.120	34.880	26.782	138.5	0.00	10.05	1500.4
CBS	1004	3.330	34.332	27.477	71.3	0.00	3.43	1487.1
CBS	1995	2.430	34.631	27.662	54.7	0.00	2.28	1492.9

STATION 8 32.39S 163.03E SEAMAP3

DATE= 04/02/1986 TIME= 2213GMT DEPTH= 986

	DEPTH	TEMP	SALINITY	SIGMA-T	A.S.V	OX	POT.TEMP	S.S
	m	°C	ppt		CL/T	ML/L	°C	M/Sec
CBS	37	22.590	35.317	24.443	349.0	0.00	22.58	1529.1
CBS	247	13.940	35.329	26.423	163.4	0.00	13.90	1509.4
CBS	542	9.160	34.703	26.860	128.7	0.00	9.10	1495.9
CBS	839	6.410	34.514	27.116	105.6	0.00	6.32	1489.9

STATION 9 32.03S 167.01E SEAMAP3

DATE= 06/02/1986 TIME= 0026GMT DEPTH= 983

	DEPTH	TEMP	SALINITY	SIGMA-T	A.S.V	OX	POT.TEMP	S.S
	m	°C	ppt		CL/T	ML/L	°C	M/Sec
CBS	29	22.260	35.673	24.619	332.1	0.00	22.25	1529.5
CBS	240	15.440	35.463	26.212	187.0	0.00	15.43	1512.4
CBS	487	8.770	34.693	26.915	125.0	0.00	8.69	1496.7
CBS	910	6.000	34.572	27.098	109.2	0.00	6.79	1495.0

Listings of Niskin bottle data for VCTOD stations 1 to 35, taken using a rosette sampler on upcasts. Summer survey SEAMAP 3 (RANRL 1/86) route A

Seamap 3 - Route A - Summer

STATION 10 32.04S 169.11E SEAMAP03

DATE= 06/02/1986 TIME= [illegible]GMT DEPTH= 4070

	DEPTH m	TEMP °C	SALINITY ppt	SIGMA-T	A.S.V CL/T	O2 ML/L	POT.TEMP °C	S.S M/Sec
CDS	0	4.940	34.300	27.286	77.7	0.00	4.94	1470.1
CDS	1040	4.440	34.300	27.286	69.7	0.00	4.05	1480.1
CDS	1570	3.060	34.300	27.351	63.4	0.00	2.94	1480.4
CDS	2020	2.260	34.643	27.663	51.9	0.00	2.12	1492.7

STATION 11 31.40S 173.33E SEAMAP03

DATE= 08/02/1986 TIME= 1105GMT DEPTH= 3130

	DEPTH m	TEMP °C	SALINITY ppt	SIGMA-T	A.S.V CL/T	O2 ML/L	POT.TEMP °C	S.S M/Sec
CDS	42	21.710	35.736	24.060	309.7	0.00	21.70	1530.2
CDS	977	3.540	34.420	27.150	101.7	0.00	3.45	1480.6
CDS	1333	3.330	34.559	27.382	68.7	0.00	3.21	1489.3
CDS	1986	2.430	34.614	27.632	53.9	0.00	2.28	1492.0

STATION 12 31.04S 178.39E SEAMAP03

DATE= 09/02/1986 TIME= 1230GMT DEPTH= 3010

	DEPTH m	TEMP °C	SALINITY ppt	SIGMA-T	A.S.V CL/T	O2 ML/L	POT.TEMP °C	S.S M/Sec
CDS	34	23.300	35.023	24.414	351.9	0.00	23.49	1532.7
CDS	35	23.500	35.023	24.414	352.0	0.00	23.49	1532.7
CDS	642	8.030	34.557	26.922	123.3	0.00	7.96	1493.0
CDS	1698	2.630	34.598	27.596	58.4	0.00	2.53	1480.0

STATION 13 30.56S 179.32W SEAMAP03

DATE= 09/2/1986 TIME= 2026GMT DEPTH= 2623

	DEPTH m	TEMP °C	SALINITY ppt	SIGMA-T	A.S.V CL/T	O2 ML/L	POT.TEMP °C	S.S M/Sec
CDS	19	21.070	35.733	24.813	313.3	0.00	21.07	1528.3
CDS	994	3.150	34.392	27.176	99.3	0.00	3.07	1487.2
CDS	1909	2.400	34.607	27.617	57.2	0.00	2.34	1493.1

STATION 14 31.10S 177.08E SEAMAP03

DATE= 13/2/1986 TIME= 0720EST DEPTH= 4038

	DEPTH m	TEMP °C	SALINITY ppt	SIGMA-T	A.S.V CL/T	O2 ML/L	POT.TEMP °C	S.S M/Sec
CDS	224	15.370	35.430	26.103	190.0	0.00	15.33	1513.9
CDS	405	12.090	35.026	26.393	153.3	0.00	12.04	1504.3
CDS	700	7.460	34.332	26.906	117.3	0.00	7.39	1491.0
CDS	1992	2.250	34.650	27.661	52.0	0.00	2.11	1492.7

STATION 15 31.17S 176.39E SEAMAP03

DATE= 14/2/1986 TIME= 1003EST DEPTH= 4046

	DEPTH m	TEMP °C	SALINITY ppt	SIGMA-T	A.S.V CL/T	O2 ML/L	POT.TEMP °C	S.S M/Sec
CDS	401	13.390	35.065	26.365	156.2	0.00	13.34	1505.5
CDS	697	7.010	34.310	26.921	124.1	0.00	7 74	1493.0
CDS	1999	2.260	34.634	27.657	52.4	0.00	2.12	1492.2

STATION 17 30.40S 176.49W SEAMAP03

DATE= 21/2/1986 TIME= [illegible]GMT DEPTH= 4643

	DEPTH m	TEMP °C	SALINITY ppt	SIGMA-T	A.S.V CL/T	O2 ML/L	POT.TEMP °C	S.S M/Sec
CDS	683	7.020	34.324	26.927	121.9	0.00	7.76	1491.5
CDS	900	3.500	34.266	27.104	105.9	0.00	3.50	1487.4
CDS	1900	2.330	34.616	27.637	54.6	0.00	2.19	1492.4

STATION 18 30.15S 172.30W SEAMAP03

DATE= 23/3/1986 TIME= 0015GMT DEPTH= 5761

	DEPTH m	TEMP °C	SALINITY ppt	SIGMA-T	A.S.V CL/T	O2 ML/L	POT.TEMP °C	S.S M/Sec
CDS	104	16.770	35.356	25.997	203.3	0.00	16.75	1515.2
CDS	405	10.620	34.816	26.701	142.2	0.00	10.57	1499.0
CDS	901	3.520	34.352	27.100	106.1	0.00	3.44	1487.2
CDS	1900	2.330	34.611	27.632	55.2	0.00	2.21	1492.3

STATION 19 30.32S 174.59W SEAMAP03

DATE= 23/2/1986 TIME= 2033GMT DEPTH= 5350

	DEPTH m	TEMP °C	SALINITY ppt	SIGMA-T	A.S.V CL/T	O2 ML/L	POT.TEMP °C	S.S M/Sec
CDS	70	19.300	35.637	25.432	236.1	0.00	19.29	1522.1
CDS	897	3.600	34.337	27.094	106.0	0.00	3.52	1487.4
CDS	2001	2.310	34.613	27.637	54.7	1.00	2.17	1492.5

STATION 25 23.57S 172.30E SEAMAP 3

DATE= 13/03/1986 TIME= 0346UTC DEPTH= 4516

	DEPTH m	TEMP °C	SALINITY ppt	SIGMA-T	A.S.V CL/T	O2 ML/L	POT.TEMP °C	S.S M/Sec
CDS	0	4.320	34.436	27.202	78.0	0.00	4.52	1468.3
CDS	401	4.320	34.436	27.202	60.0	0.00	4.44	1490.7
CDS	1994	2.260	34.656	27.675	50.9	0.00	2.12	1492.2

Listings of Niskin bottle data for VCTOD stations 1 to 35, taken using a rosette sampler on upcasts. Summer survey SEAMAP 3 (RANRL 1/86) route A

STATION 26 25.19S 169.43E SEAMAP 3

DATE= 14/03/1986 TIME= 1754UTC DEPTH= 2409

	DEPTH	TEMP	SALINITY	SIGMA-T	A.S.V	O2	POT.TEMP	S.S
	m	°C	Ppt		CL/T	ML/L	°C	M/Sec
OBS	74	19.330	35.719	25.433	256.0	0.00	19.32	1522.9
OBS	798	6.130	34.446	27.098	186.2	0.00	6.06	1480.8
OBS	1909	2.330	34.633	27.667	31.9	0.00	2.19	1491.3

STATION 27 26.47S 166.42E SEAMAP 3

DATE= 16/03/86 TIME= 0220UTC DEPTH= 3440

	DEPTH	TEMP	SALINITY	SIGMA-T	A.S.V	O2	POT.TEMP	S.S
	m	°C	Ppt		CL/T	ML/L	°C	M/Sec
OBS	146	19.810	35.710	25.363	246.3	0.00	18.98	1522.6
OBS	699	8.040	34.610	26.969	128.3	0.00	7.99	1490.2
OBS	1490	3.170	34.685	27.554	63.0	0.00	3.06	1487.7
OBS	1998	2.360	34.669	27.677	31.1	0.00	2.22	1492.6

STATION 28 27.20S 165.27E SEAMAP 3

DATE= 16/03/1986 TIME= 1501UTC DEPTH= 3530

	DEPTH	TEMP	SALINITY	SIGMA-T	A.S.V	O2	POT.TEMP	S.S
	m	°C	Ppt		CL/T	ML/L	°C	M/Sec
OBS	103	19.930	35.732	25.335	266.6	0.00	19.93	1524.5
OBS	506	12.020	35.060	26.639	151.6	0.00	11.95	1505.9
OBS	1991	2.360	34.673	27.680	30.9	0.00	2.22	1492.7

STATION 29 29.21S 161.15E SEAMAP 3

DATE= 17/03/1986 TIME= 1053UTC DEPTH= 1430

	DEPTH	TEMP	SALINITY	SIGMA-T	A.S.V	O2	POT.TEMP	S.S
	m	°C	Ppt		CL/T	ML/L	°C	M/Sec
OBS	32	24.120	35.712	24.147	377.3	0.00	24.11	1534.1
OBS	105	20.340	35.719	25.221	277.5	0.00	20.32	1525.6
OBS	799	7.380	34.366	27.024	115.4	0.00	7.30	1493.1
OBS	1394	3.550	34.576	27.496	69.1	0.00	3.44	1487.5

STATION 30 29.50S 159.51E SEAMAP 3

DATE= 18/03/1986 TIME= 0704UTC DEPTH= 2030

	DEPTH	TEMP	SALINITY	SIGMA-T	A.S.V	O2	POT.TEMP	S.S
	m	°C	Ppt		CL/T	ML/L	°C	M/Sec
OBS	41	23.160	35.683	24.407	352.0	0.00	23.15	1531.8
OBS	43	23.140	35.687	24.416	352.1	0.00	23.13	1531.8
OBS	450	12.460	35.137	26.607	153.6	0.00	12.40	1506.6

STATION 31 30.43S 150.13E SEAMAP 3

DATE= 18/03/1986 TIME= 2051UTC DEPTH= 3669

	DEPTH	TEMP	SALINITY	SIGMA-T	A.S.V	O2	POT.TEMP	S.S
	m	°C	Ppt		CL/T	ML/L	°C	M/Sec
OBS	2409	1.970	34.731	27.759	43.9	0.00	1.79	1499.6

STATION 32 31.20S 156.45E SEAMAP 3

DATE= 19/03/1986 TIME= 2022UTC DEPTH= 4627

	DEPTH	TEMP	SALINITY	SIGMA-T	A.S.V	O2	POT.TEMP	S.S
	m	°C	Ppt		CL/T	ML/L	°C	M/Sec
OBS	25	23.070	35.476	23.682	421.4	0.00	23.06	1533.9
OBS	570	9.920	34.790	26.802	135.7	0.00	9.85	1499.3
OBS	2496	2.050	34.787	27.733	46.7	0.00	1.87	1500.8
OBS	4400	1.300	34.697	27.780	40.7	0.00	.83	1531.2

Listings of Niskin bottle data for VCTOD stations 1 to 35, taken using a rosette sampler on upcasts. Summer survey SEAMAP 3 (RANRL 1/86) route A

THE VCTOD SALINITY IS NOT WELL CALIBRATED AND NO CALIBRATION DATA IS AVAILABLE FOR STATIONS 33 TO 35 .

PART B PRESENTS SUMMER DATA FOR ROUTE B OF FIGURE 1 (SEE PAGE 2)

ROUTE B WAS COVERED BY TWO SURVEYS :-
SURVEY SEAMAP 1 IN JANUARY TO FEBRUARY 1984 *SURVEY SEAMAP 5 IN FEBRUARY 1987*

Text continued on page 81

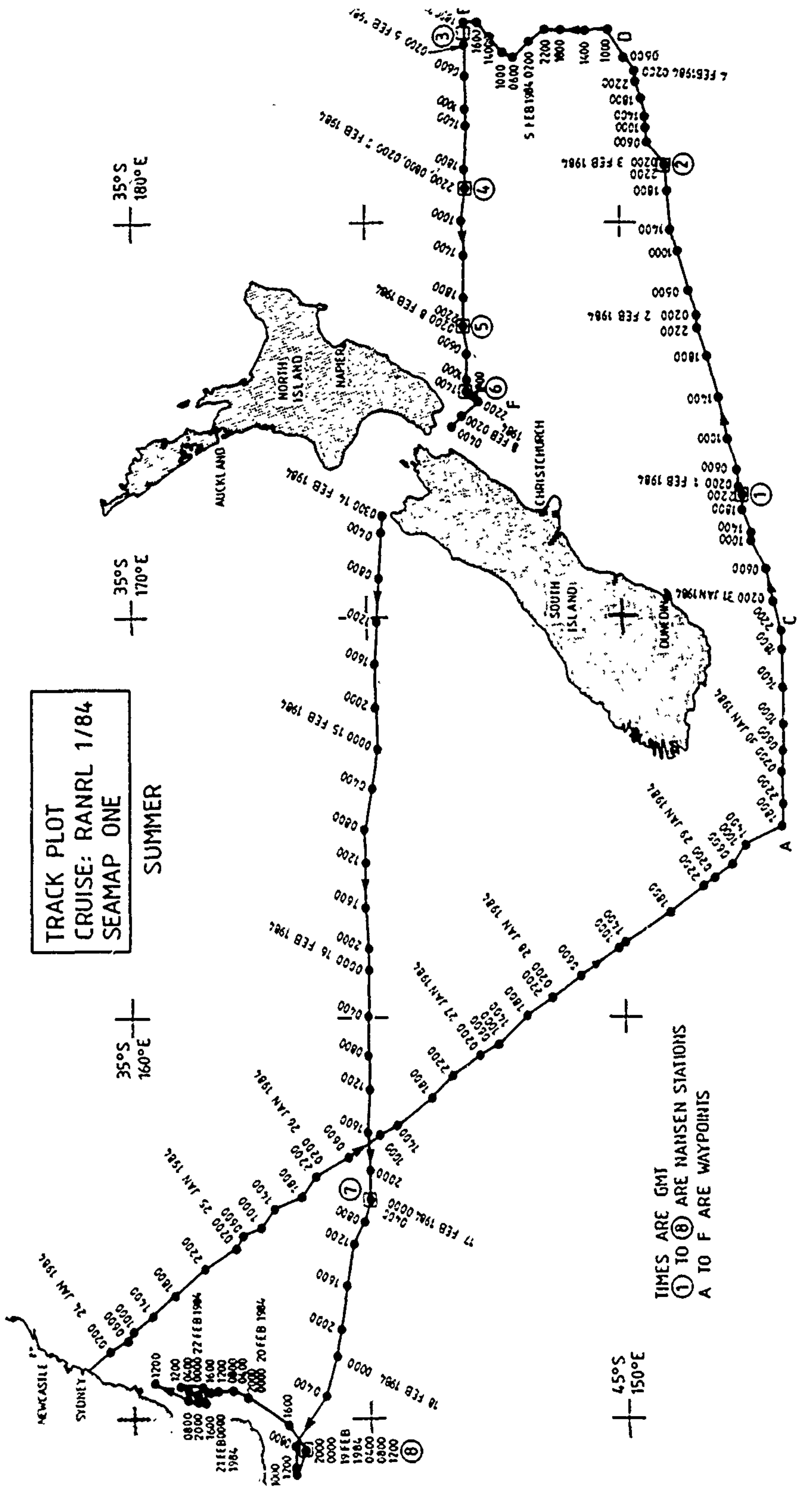


Figure 30. Track plot and oceanographic station positions for SEAMAP 1 (RANRL 1/84) summer survey on route B in the South Pacific Ocean, 24 January 1984 to 22 February 1984

PART B - SUMMER SURVEYS FOR SEAMAP SOUTH PACIFIC ROUTE B

Part B presents oceanographic data for two surveys. Survey RANRL 1/84 (SEAMAP 1) was made in south hemispheric oceanographic summer (February to March 1984) from Sydney to south of New Zealand, Chatham Islands, Cook Strait, Bass Strait, and return to Sydney (figure 30). Acoustic and geophysical data for the cruise are given in other sources (see Appendix II). This was the first of the SEAMAP series of cruises made on the naval oceanographic research vessel HMAS Cook. The remainder of route B between Sydney and New Zealand was completed on cruise SEAMAP 5 (RANRL 18/87) discussed in the following section (page 110).

Data for the winter counterparts of the summer cruise data given here, designated as RANRL 6/85 (SEAMAP 2), and RANRL 17/86 (SEAMAP 4) will be given in a following report (Hamilton and Boyle, 1989).

Data for SEAMAP survey one (RANRL 1/84) - route B - Summer

Surface parameters

Sea state, swell height, and wind vectors

Values of observations made at four-hourly intervals are shown in figures 31 and 32. Table 1 (on page 5) shows the sea conditions associated with the sea state values. Much of the cruise occurred in sea states of 4 or less, associated with winds under 25 kn, and swell height of 2 m, corresponding to slight to moderate conditions. Wind speeds to 40 kn were encountered east of the Chatham Islands with rough to very rough seas and 5 m swell.

Surface temperature and salinity

Sea Surface Temperature (SST)

SST is shown in figure 33 as discrete values taken at four-hourly intervals from the continuous record of a hull mounted sensor. The data is uncalibrated. The spatial distribution does not allow good contours to be drawn from this data, but see figure 34 for an attempt. Highest temperatures are seen along and east of the east Australian coast, in the East Australian Current and its eastward continuation as the Tasman Front. Coldest waters are seen south-west of New Zealand. Temperature range is 11.9 to 24.4°C (uncalibrated).

RMC Wellington satellite derived SST patterns are shown for New Zealand waters (figure 37) for weeks ending 30 January, and 6, 13, 20 February 1984. The RMC charts state that the derived SSTs may be low by 1 to 4°C. Warm waters extend down the west coast of the South Island, but their southwards extension below South Island is not defined. Uncalibrated salinity and temperature hourly values from a thermo-salinograph are shown in figures 35 and 36.

Four Nansen bottle values plotted for comparison, with the salinity scale shown as (Salinity - 34) PSU, show the salinity values to be high by approximately 0.25 PSU. Surface salinity decreases from 43°S, 160°E along the track to reach minimum values around 47°S, 173°40'E with values less than 35 uncalibrated units to near waypoint E. The general area of lower salinity to the east of New Zealand is indicative of the usual position of lower salinities seen south of the Subtropical Convergence.

Bathymetry (figures 39, 41, 44, 46)

The bathymetry is shown as five sections (in four diagrams) along ship track corresponding to the waypoints Sydney, ABCDEF shown in figure 30. The sections are drawn from hourly observations from either the centre beam of the Stabilised Narrow Beam Echo Sounding System (SNBESS) or a Precision Depth Recorder (PDR). In cases where depth was not available, eg when depth was lost because of rough sea conditions, depth is taken from GEBCO chart 5.10 (General Bathymetric Charts of the Oceans published by the Canadian Hydrographic Service, Ottawa, Canada). GEBCO values are marked with a G. Features such as seamounts are named where possible but since the bathymetry is self explanatory no further descriptions will be made. Note that features are occasionally crossed more than once when the ship backtracks. The sections are smoothed interpretations showing major features, not detailed bathymetric data.

Temperature and salinity cross sections

XBT Temperature cross sections

Six XBT sections are given, corresponding to straight line traverses between way points Sydney and ABCDEF shown on figure 30

Sydney to south of New Zealand (figure 38)

An eddy or meander of the East Australian Current is crossed from XBT numbers 1 to 13. A subsurface warm core feature is sited on XBTs 6 and 17 which is masked above 200 m by the surface expression of the first meander. XBTs 18 and 19 show cooler waters separating the first meander from another warm water eddy or meander between XBTs 20 and 28 which is very much weaker than than the first, eg the 15°C isotherm is at 400 m in the first feature and at 100 m in the second. The two features are followed by a third body of shallow warm surface water (XBT 32) which has no subsurface expression below about 70 m. Waters then get cooler to the south and isotherm slopes indicate northwards flow until point A, where southward flowing warmer waters are crossed on the western side of the Snares Shelf. XBT are not available to properly define the eastern side of this current. Sloping isotherms indicate a northward flow component of current east of the plateau (the Southland current). RMC SST isotherms (figure 37) indicate the two currents are linked. The western current may be related to the Subtropical Convergence, at least in the south.

Text continued on page 96

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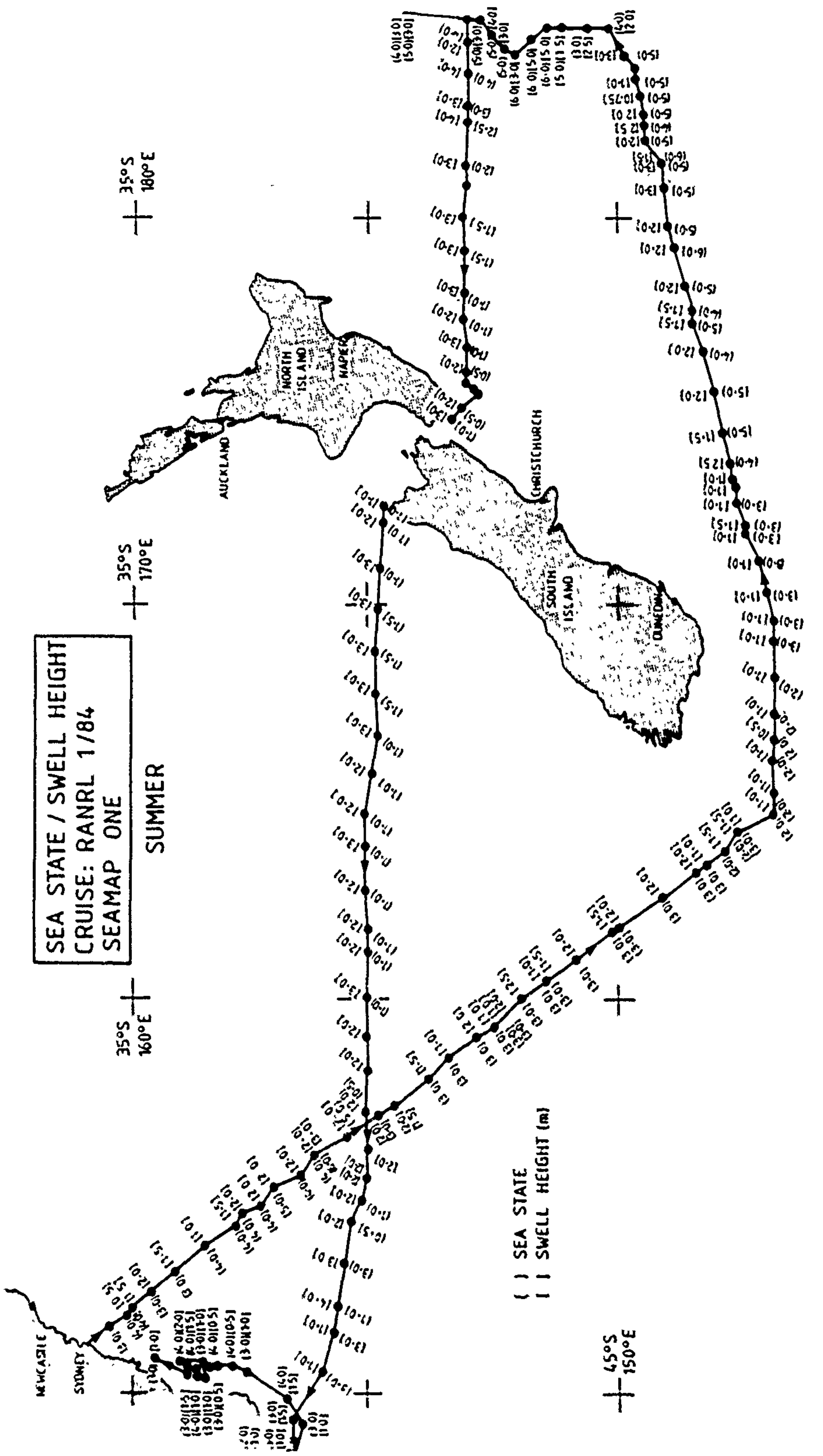

Figure 31. Sea state and swell height for SEAMAP route B in summer 1984 on survey SEAMAP 1 (RANRL 1/84)

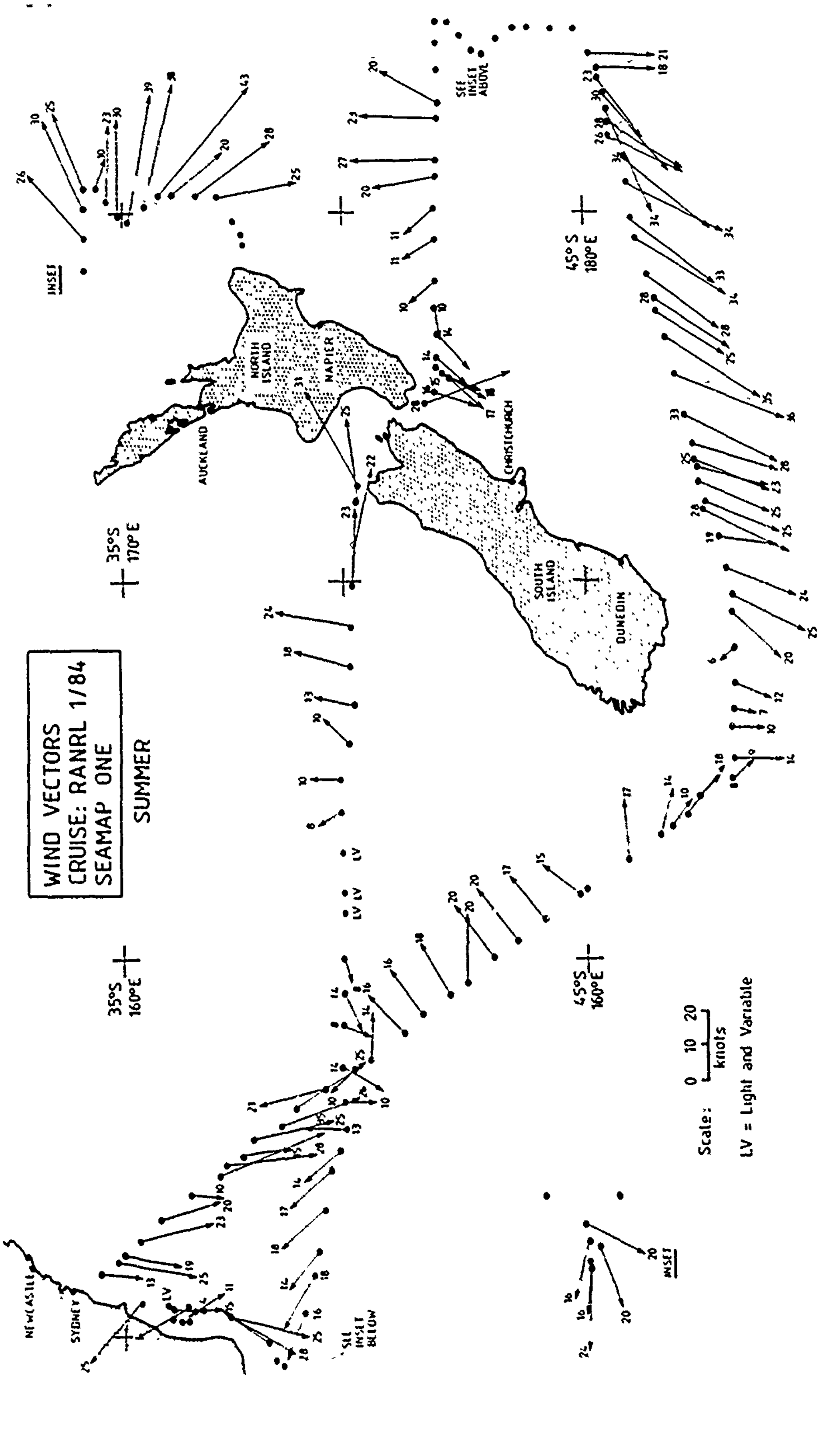

Figure 32. Wind vectors for SEAMAP route B in summer 1984 on survey SEAMAP 1 (RANRL 1/84)

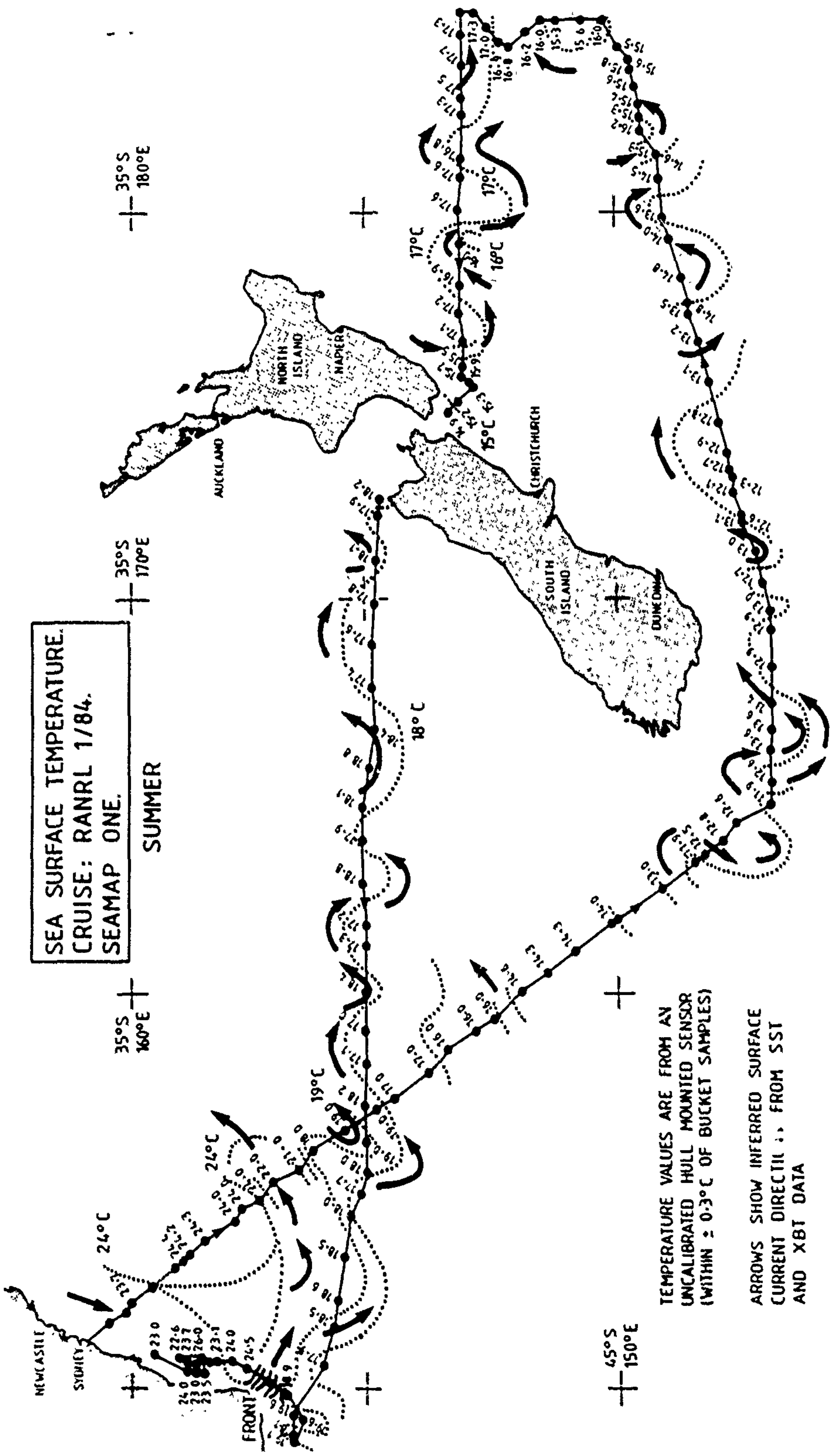

Figure 33. Sea surface temperature values for SEAMAP route B in summer 1984 on survey SEAMAP 1 (RANRL 1/84)

Figure 34. Sea surface temperature contours for SEAMAP route B in summer 1984 on survey SEAMAP 1 (RANRL 1/84)

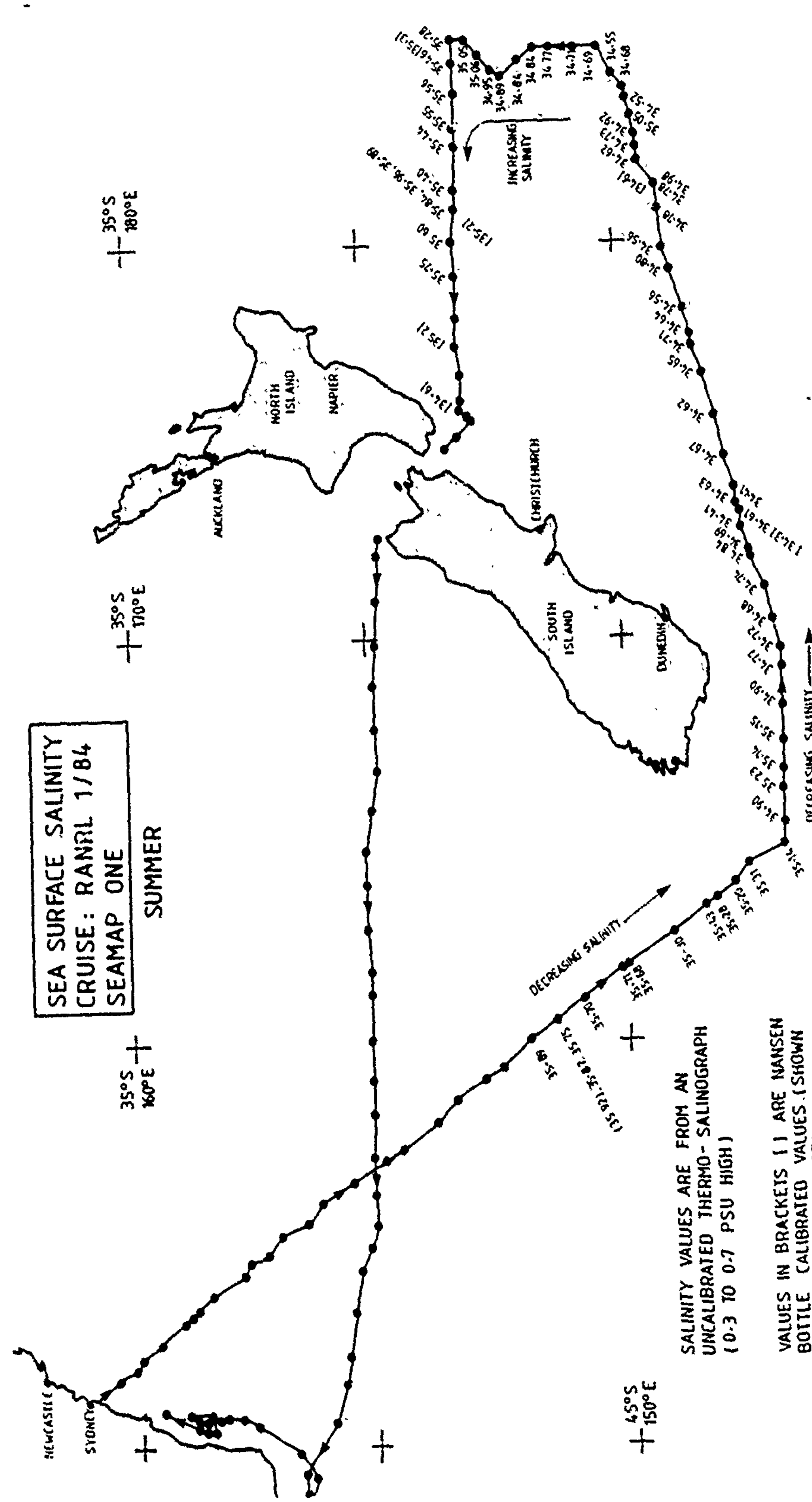

Figure 35. Sea surface salinity values for SEAMAP route B in summer 1984 on survey SEAMAP 1 (RANRL 1/84)

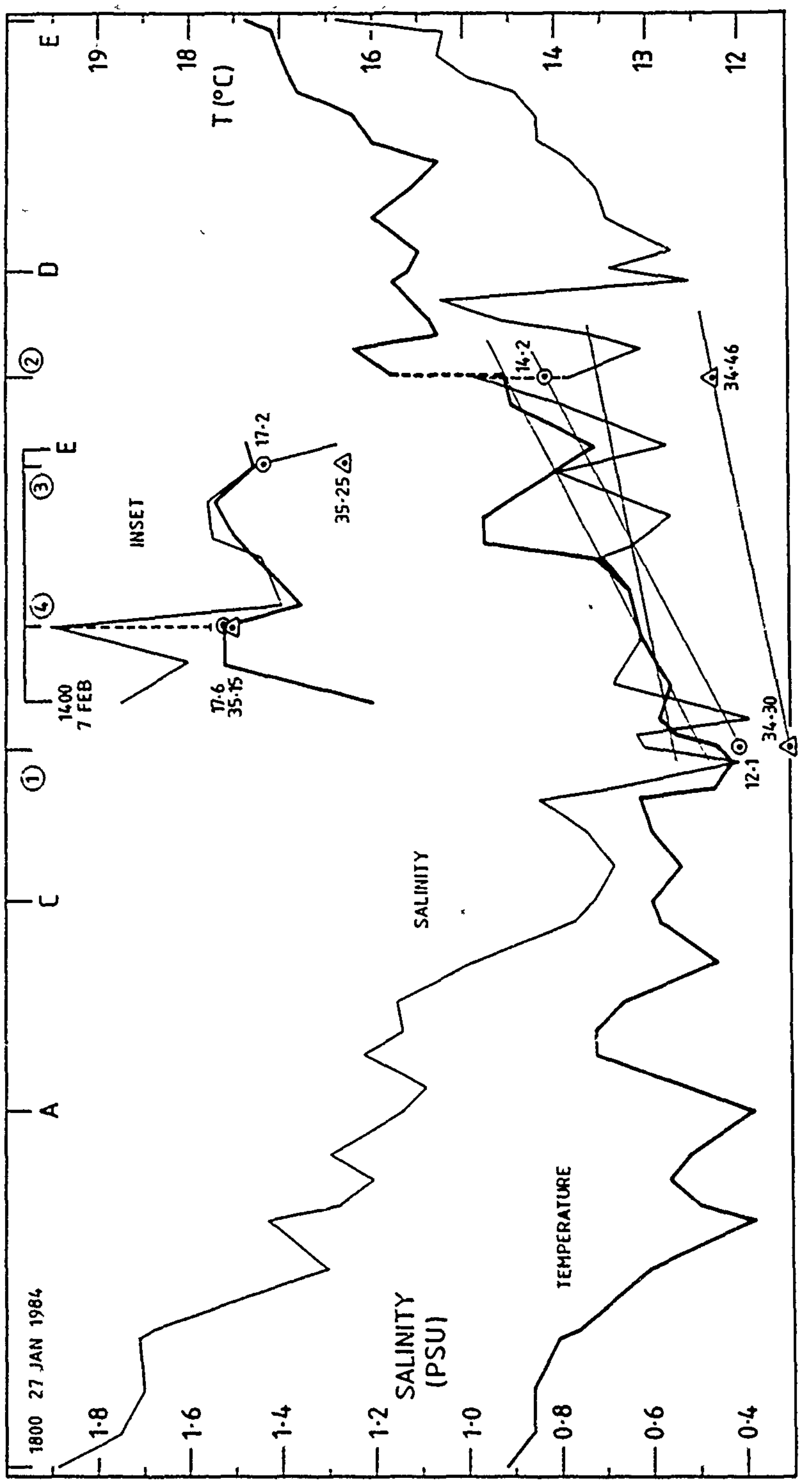

Fig. Surface temperature and salinity (uncalibrated) SEAMAP 1. RANRL 1/84 - Summer.
A - E are waypoints. ① - ④ are Nansen stations.

Figure 36. Surface temperature and salinity versus cumulative distance travelled for SEAMAP route B in summer 1984 on survey SEAMAP 1 (RANRL 1/84)

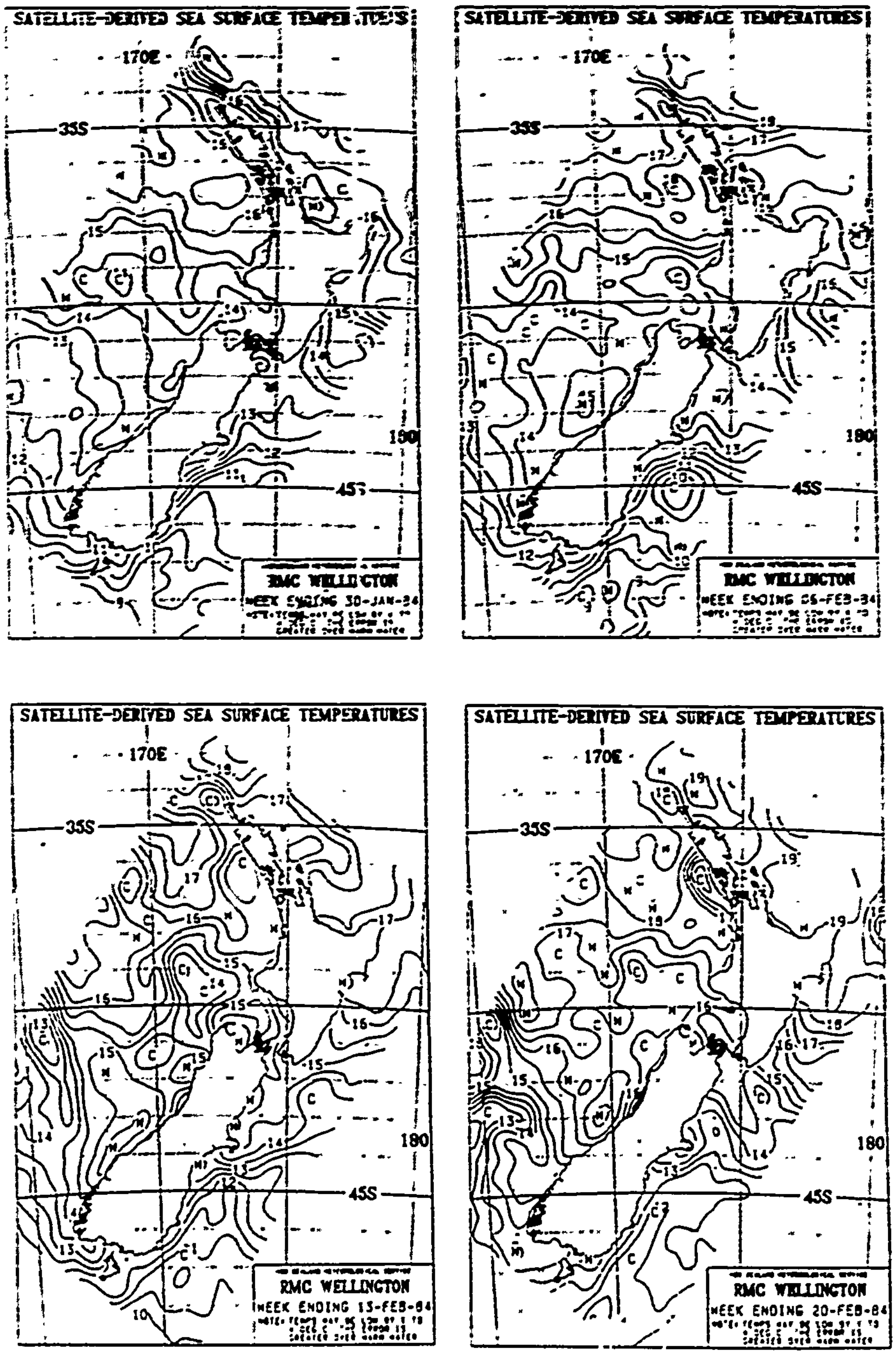

Figure 37. Sea surface temperature contours derived by Royal Meterological Centre Wellington, New Zealand from satellite data for 30 January and 6, 13, 20 February 1984 coinciding with sections of SEAMAP 1 summer survey (RANRL 1/84) route B

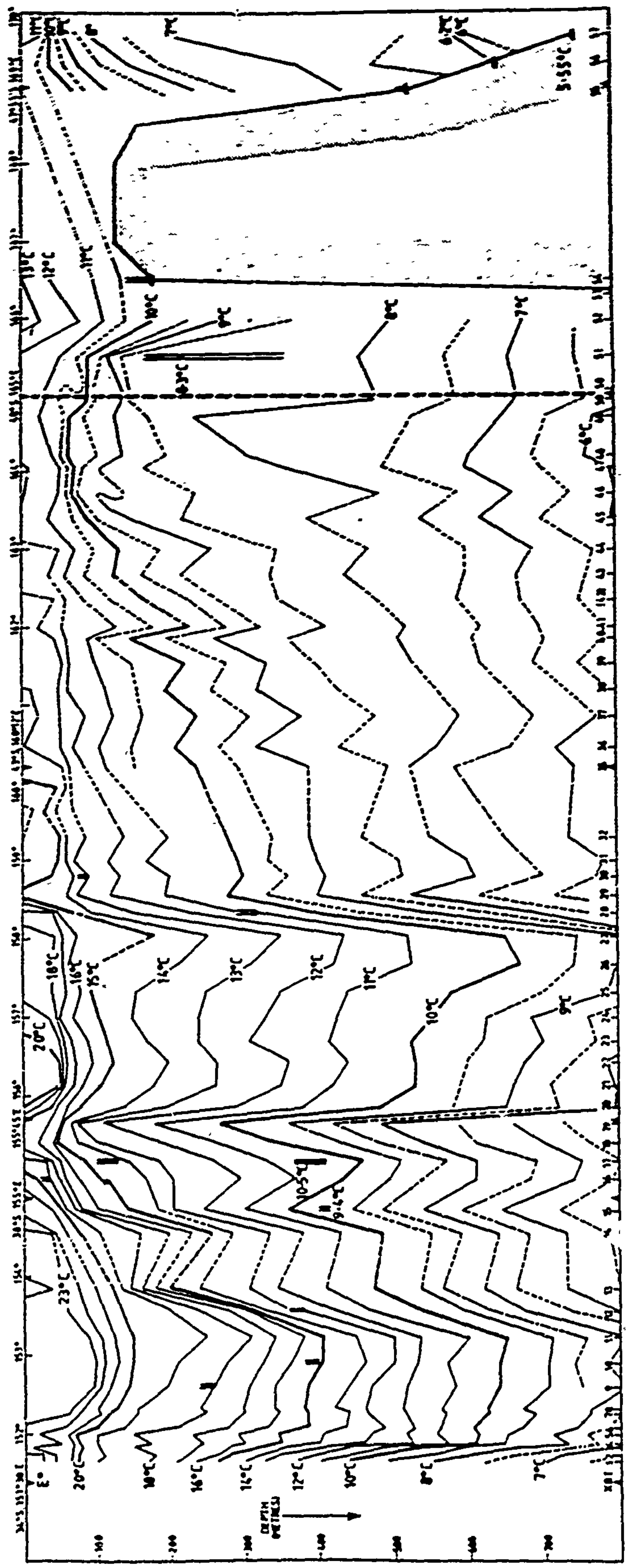

Figure 38. XBT temperature section from Sydney to waypoint C (47°49'S, 170°E) for 24 to 29 January 1984. Summer survey SEAMAP 1 (RANRL 1/84) route B. Parallel vertical lines show isothermal waters

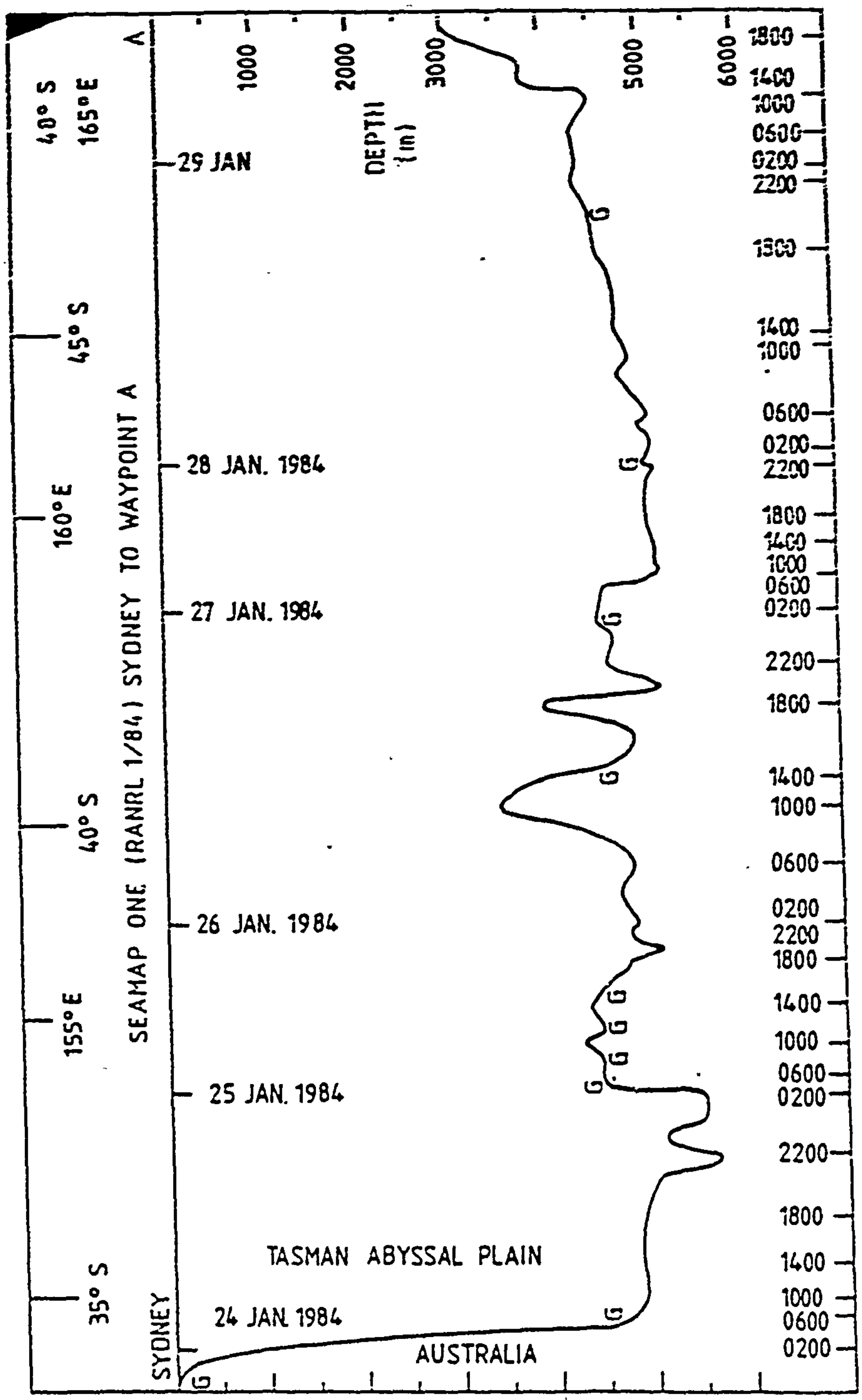

Figure 39. Bathymetry from Sydney to waypoint A (48°S, 165°E). Summer survey SEAMAP 1 (RANRL 1/84) route B. (See figure 41 for bathymetry from waypoint A to waypoint C)

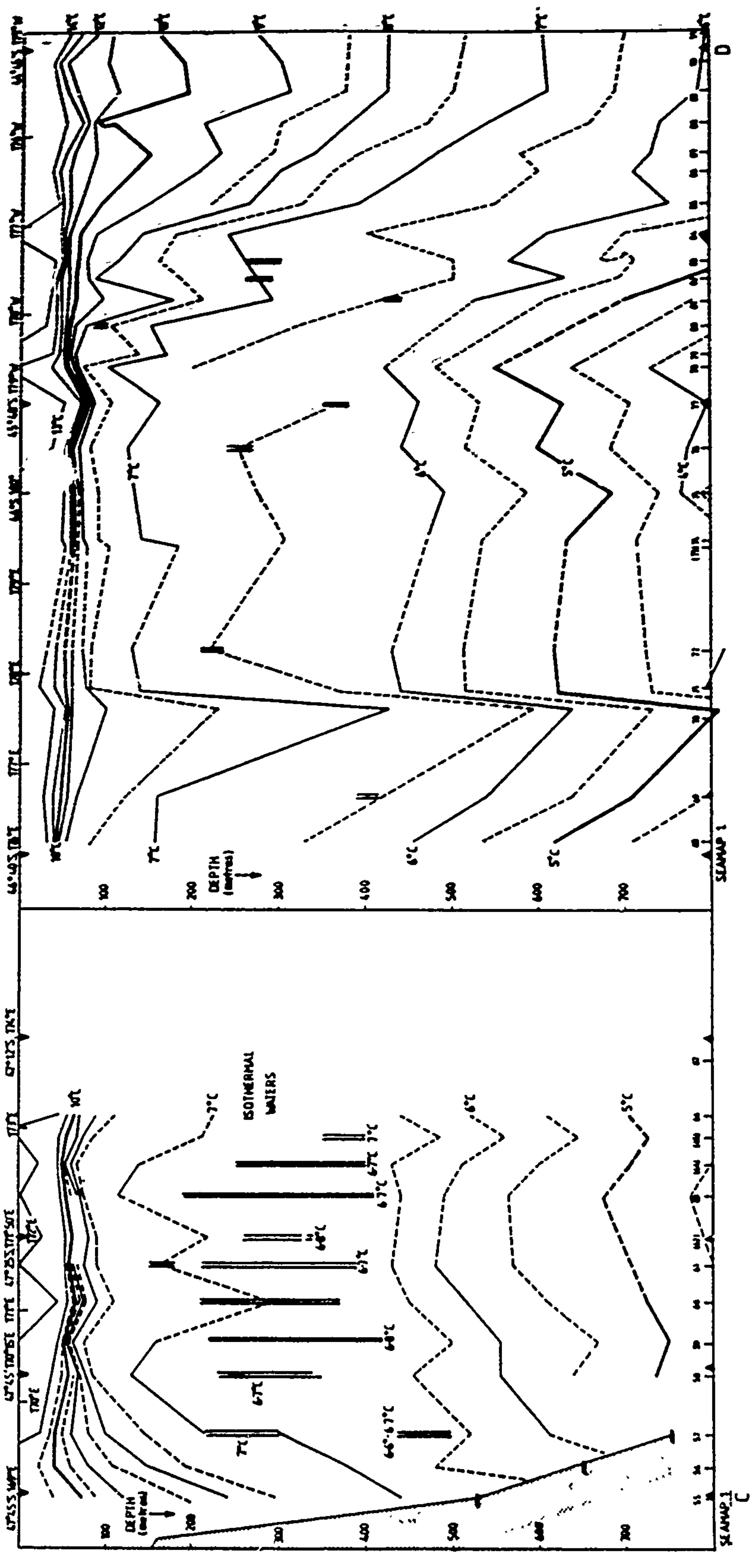

Figure 40. XBT temperature section from waypoint C (47°49'S, 170°E) to way- point D (44°45'S, 175°W) for 29 January to 4 February 1984. Summer survey SEAMAP 1 (RANRL 1/84) route B. Parallel vertical lines show isothermal waters

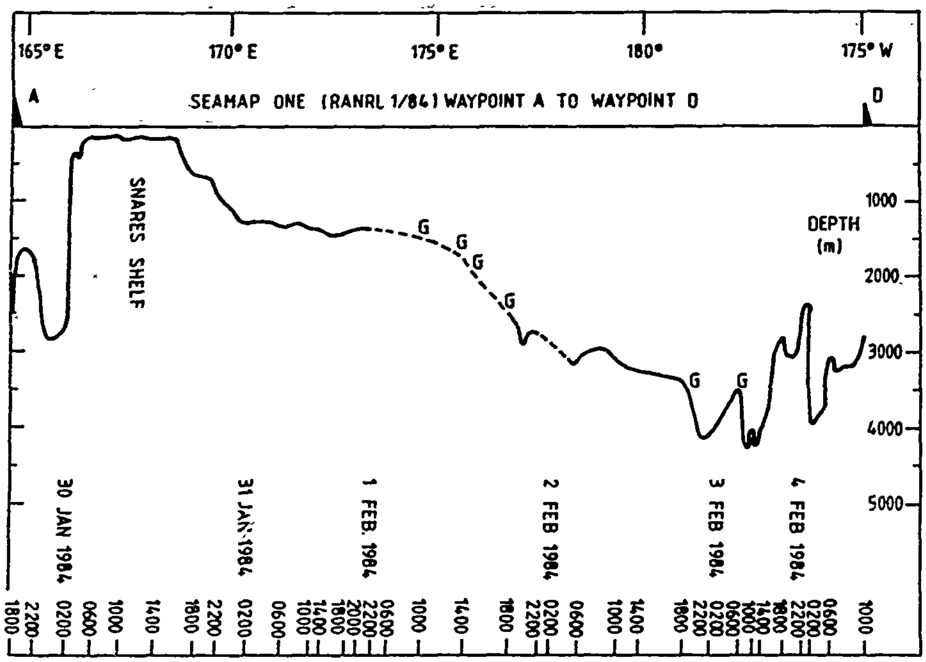

Figure 41. Bathymetry from waypoint A (48°S, 165°E) to waypoint D (44°45'S, 175°W) via waypoint C (47°49'S, 170°E). Summer survey SEAMAP 1 (RANRL 1/84) route B

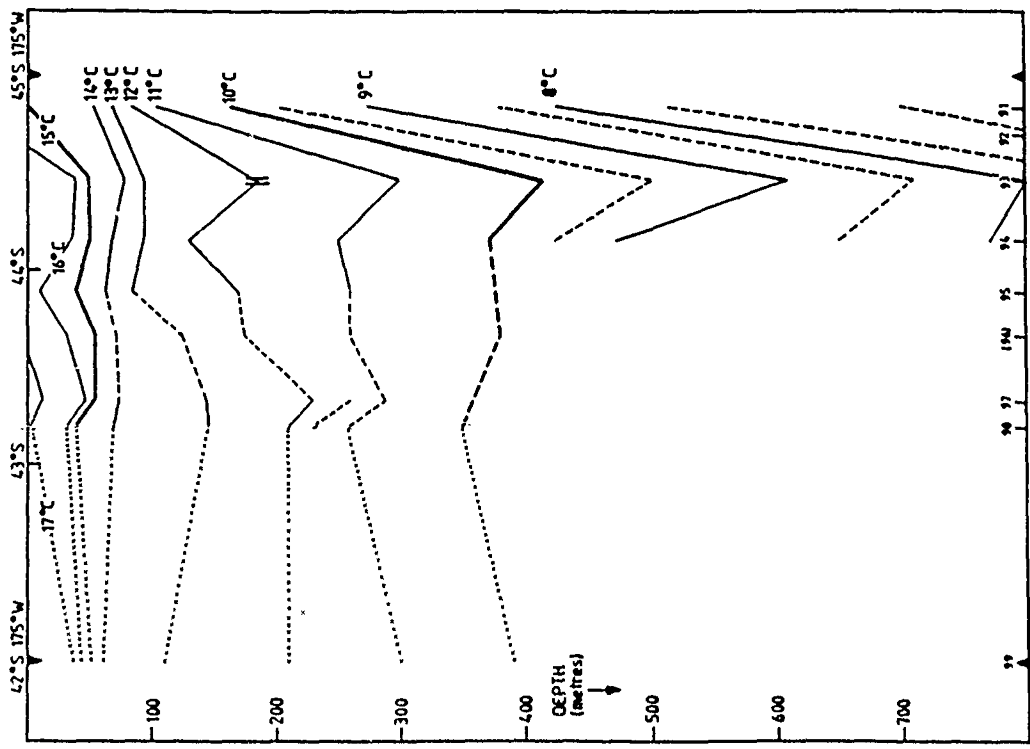

Figure 42. XBT temperature section from waypoint D (44°45'S, 175°W) to way- point E (42°S, 175°W) for 4, 5 February 1984. Summer survey SEAMAP 1 (RANRL 1/84) route B. (See figure 44 for Bathymetry)

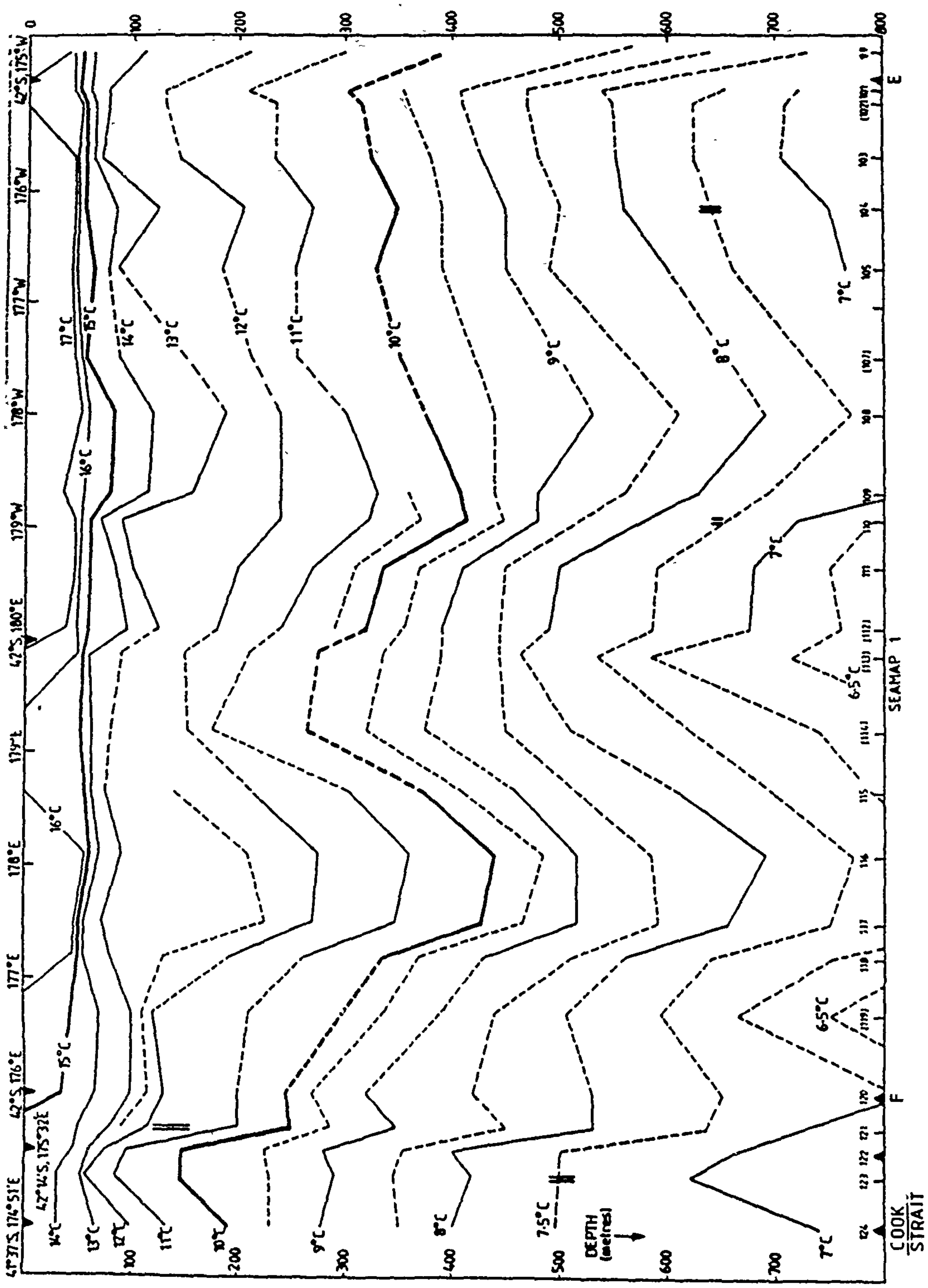

Figure 43. XBT temperature section from waypoint E (42°S, 175°W) to eastern Cook Strait (41°37'S, 174°51'E) for 6 to 8 February 1984. Summer survey SEAMAP 1 (RANRL 1/84) route B

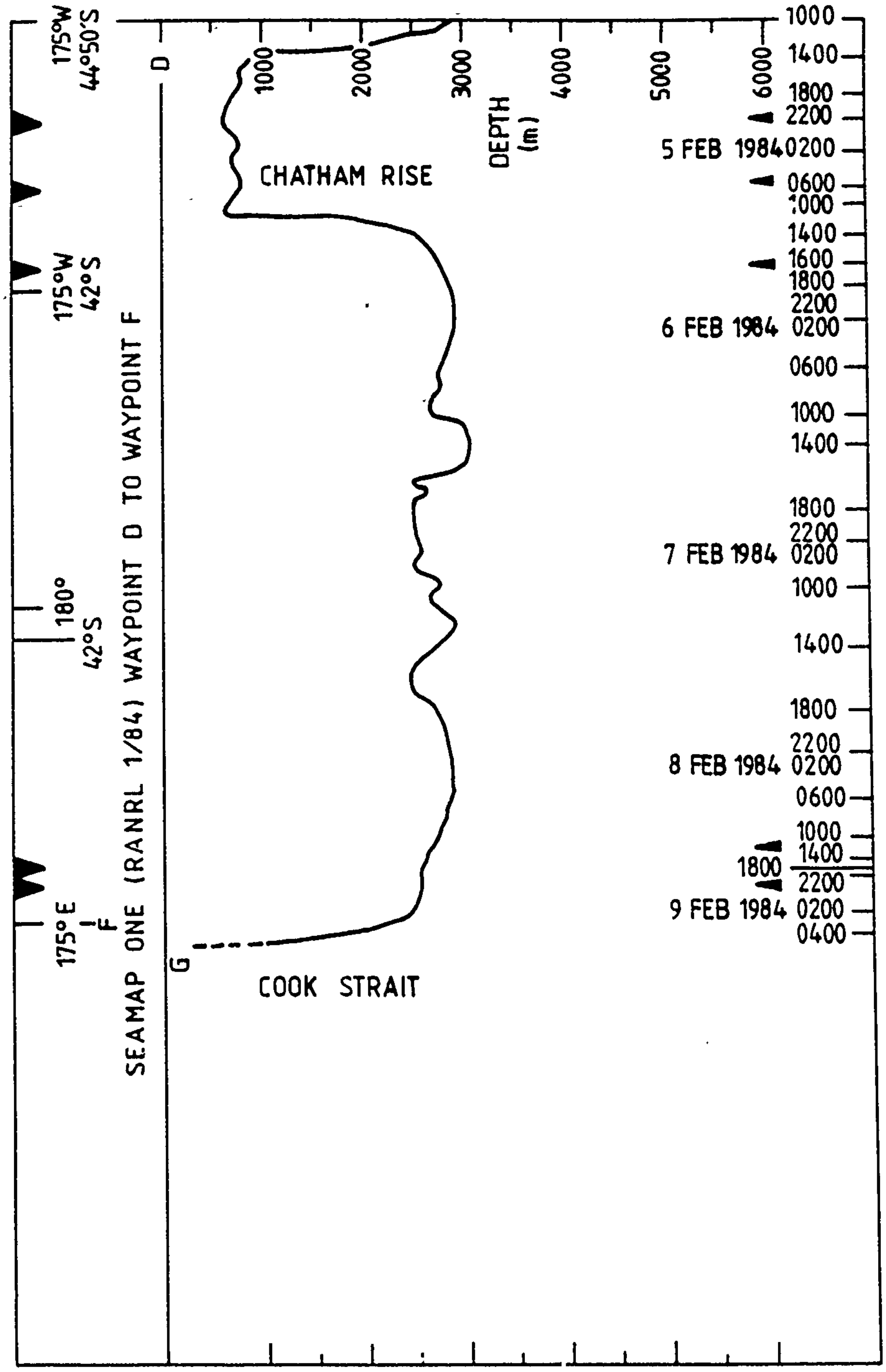

Figure 44. Bathymetry from waypoint D (44°45'S, 175°W) to Waypoint F (via waypoint E). Summer survey SEAMAP 1 (RANRL 1/84) route B

South of New Zealand (figure 40)

XBT 57 to 66 show isothermal waters between about 200 to 400 m, with the thermocline at 70 m depth from XBT 57 to 80. The weak thermocline indicates summer heating of surface waters. These sections show the coldest waters for the cruise, related to northward extension of the Subtropical Convergence. A meander of the convergence is sited on XBT 70. North of XBT 77 waters become warmer below 100 m, with the 7°C isotherm deepening by 450 m, as the Subtropical Convergence is crossed.

East of Chatham Islands (figure 42)

The waters from way point D northwards become very much warmer at depth between XBT 91 to 93, again indicating crossing of the Subtropical Convergence before XBT 91; with near surface waters warming gradually. There is a gap in coverage between XBTs 98 and 99, caused by rough weather and high sea states.

North of Chatham Islands to south of North Island (figure 43)

Some broad scale weak meandering structure is seen centred on XBT 108 and 109, and XBT 116. Isotherms shallow from XBT 116 towards New Zealand, perhaps a northward expression of a part of the Subtropical Convergence. Summer heating has apparently capped the two warm core structures with warm pools of water, which have not masked the surface expression of these features.

Nelson to Bass Strait (figure 45)

This section is shown on one figure to 800 m and on another to 2000 m. An East Australian Current eddy or meander is seen about XBTs 161 and 162, showing a southward penetration past Bass Strait. This flow occurs between Australia and the Janzoon seamount. The feature has stronger temperature gradients on the western side. A weaker warm core feature is seen about XBT 152. See figures 33 to 34 for the surface manifestation of this structure. From Nelson to XBT 149 broad scale weak meandering is suggested, with a broad southwards current on the edge of the western New Zealand coastline, with surface recirculation to the north to 100 m. Warm surface waters at 162°30'E occur on the western edge of a meander.

The section to 2000 m (figure 45) shows that features from the Australian coast to 158°E show good correlation over the whole water column. East of 158°E, away from the influence of the East Australian current, the correlations are not nearly as marked, indicating that surface currents do not have as much penetration as the EAC area.

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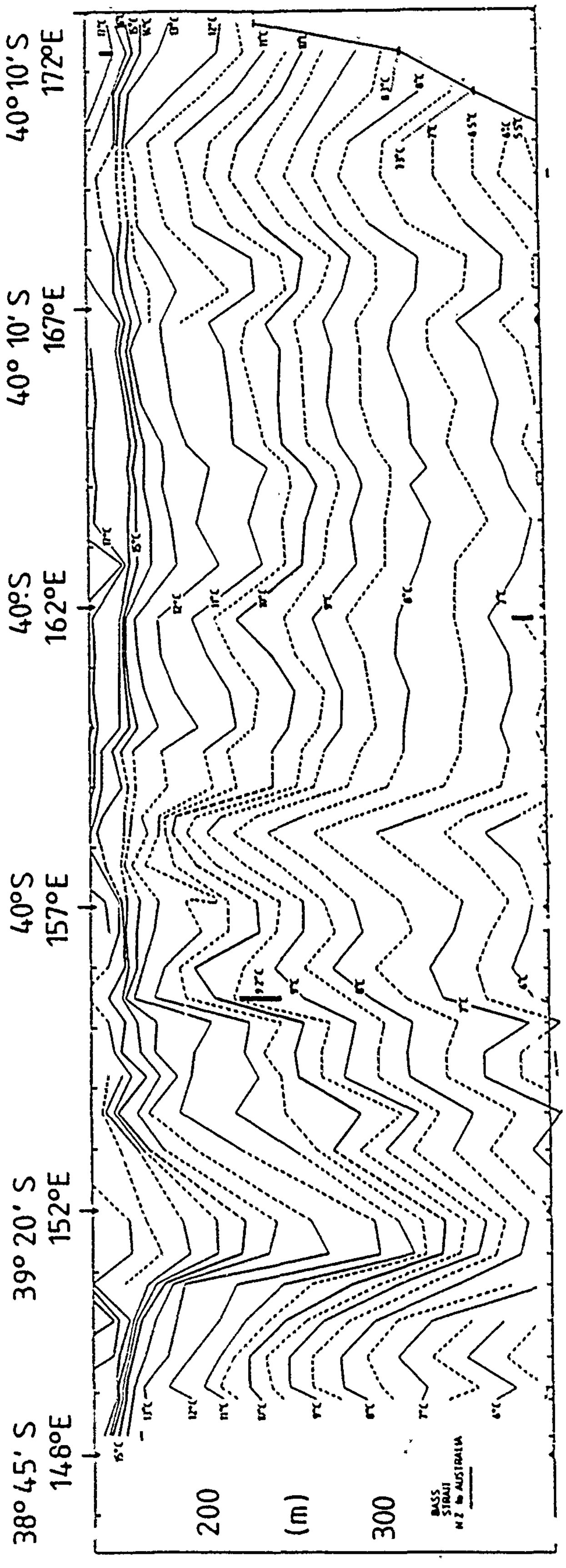

Figure 45(a). XBT temperature section from west of Cook Strait to Bass Strait for 14, 18 February 1984. Summer survey SEAMAP 1 (RANRL 1/84) route B to 800 m

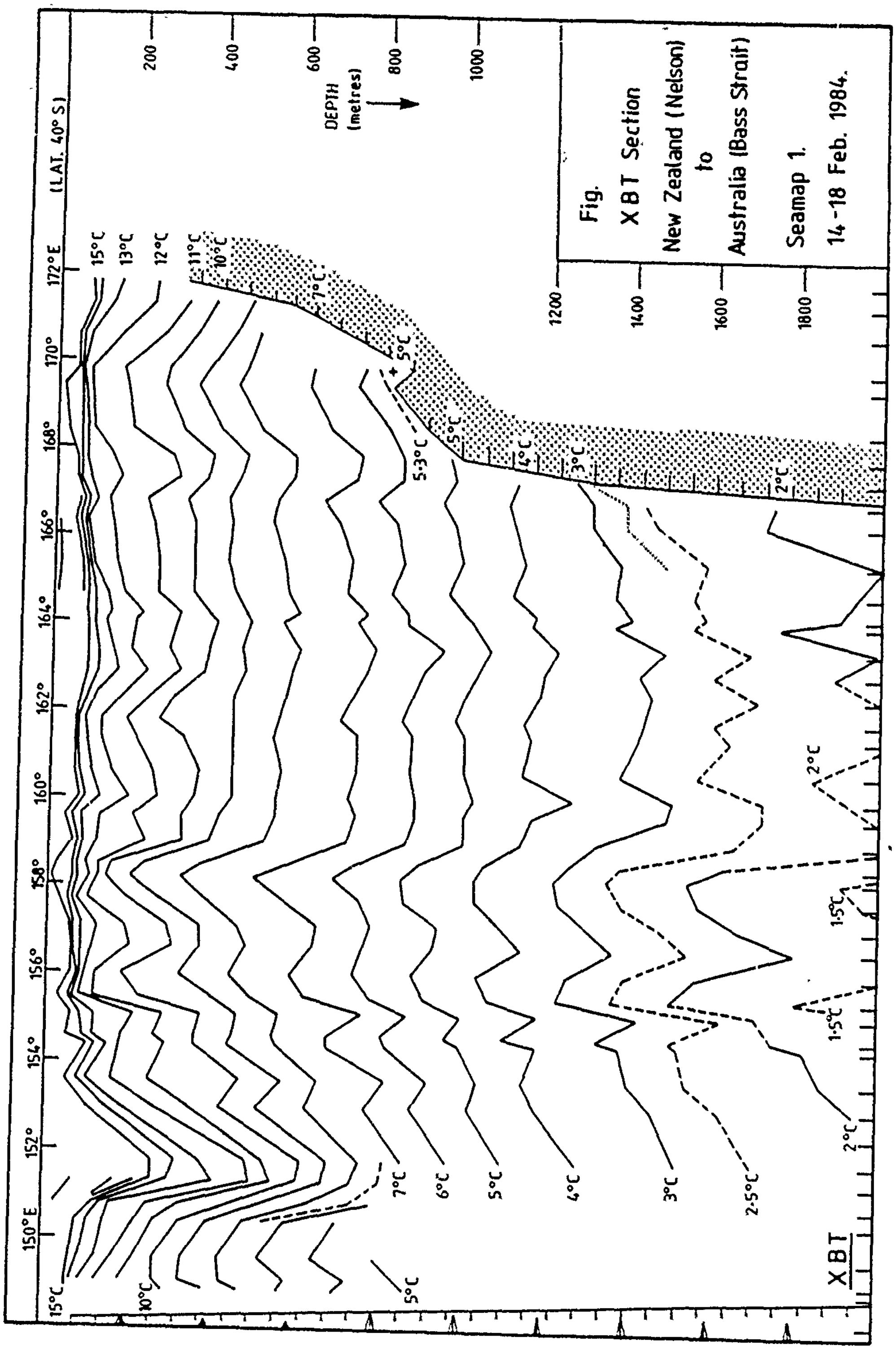

Figure 45(b). XBT temperature section from west of Cook Strait to Bass Strait for 14, 18 February 1984. Summer survey SEAMAP 1 (RANRL 1/84) route B to 2000 m

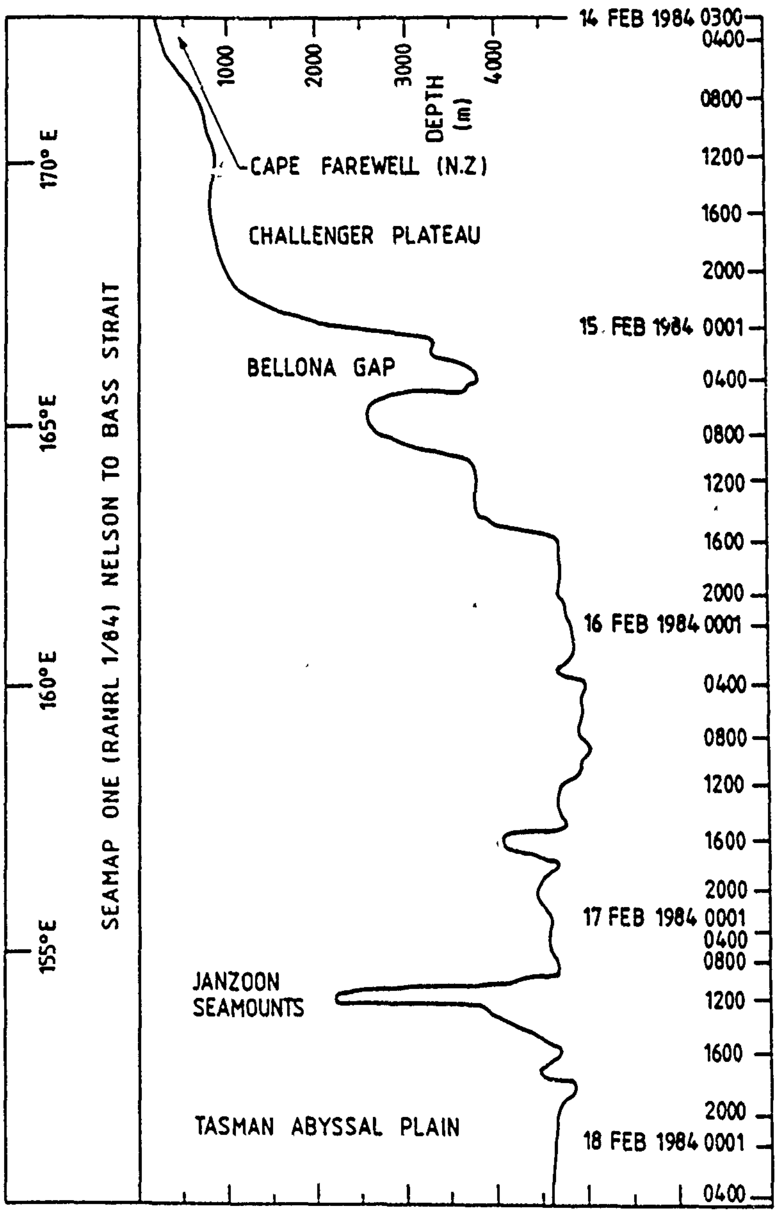

Figure 46. Bathymetry from Cook Strait to Bass Strait. Summer survey SEAMAP 1 (RANRL 1/84) route B

NANSEN station data and listings

Sites of the eight Nansen stations occupied are shown in figure 30.

Listings and profiles of temperature, salinity, density (sigma-t), and sound-speed are given pages 104 to 108, with a composite temperature-salinity diagram. All Nansen stations show warmer less dense surface waters with a rapid increase in density to about 100 m, followed by more gradual density increases, consistent with summer heating of surface waters. Deep mixed layers are not seen in the Nansen data. Sonic layer depths cannot be estimated from the Nansen data because of the bottle spacing used, except that they are less than 50 m at the eight Nansen sites. Highest geostrophic current component between station pairs is 5.5 cm/s to the east relative to 1000 m for stations 2 and 4 (which are separated by the Chatham Rise). Temperature and salinity sections drawn between the widely spaced stations do show some structure (figures 47 and 48). The higher value salinity minimum at station 4 may be caused by a branch of Antarctic water entering from the Tasman Sea from north of New Zealand (with the East Auckland and East Cape Currents) or from the north east. Between stations 2 and 3 is seen evidence of the northward progression of another branch of AAIW flowing round the Chatham Rise (eg Wyrtki, 1962). The salinity section shows the Subtropical Convergence to be south of station 2, as also found from the XBT cross-section of figure 40.

VCTOD station data and listings

VCTOD stations were not occupied on this cruise.

Currents

Figure 33 shows surface current directions inferred from the XBT data and surface isotherms. Nansen station spacing is too large to allow adequate resolution of geostrophic current components. Surface geostrophic values between 1 and 2 are neglibible; between 2 and 3 is less than 4 cm/s to the east; between 3 and 4 are about 1 cm/s to the north.

Additional data

Tracks of vessels involved in the CSIRO merchant ship XBT programme have not been ascertained.

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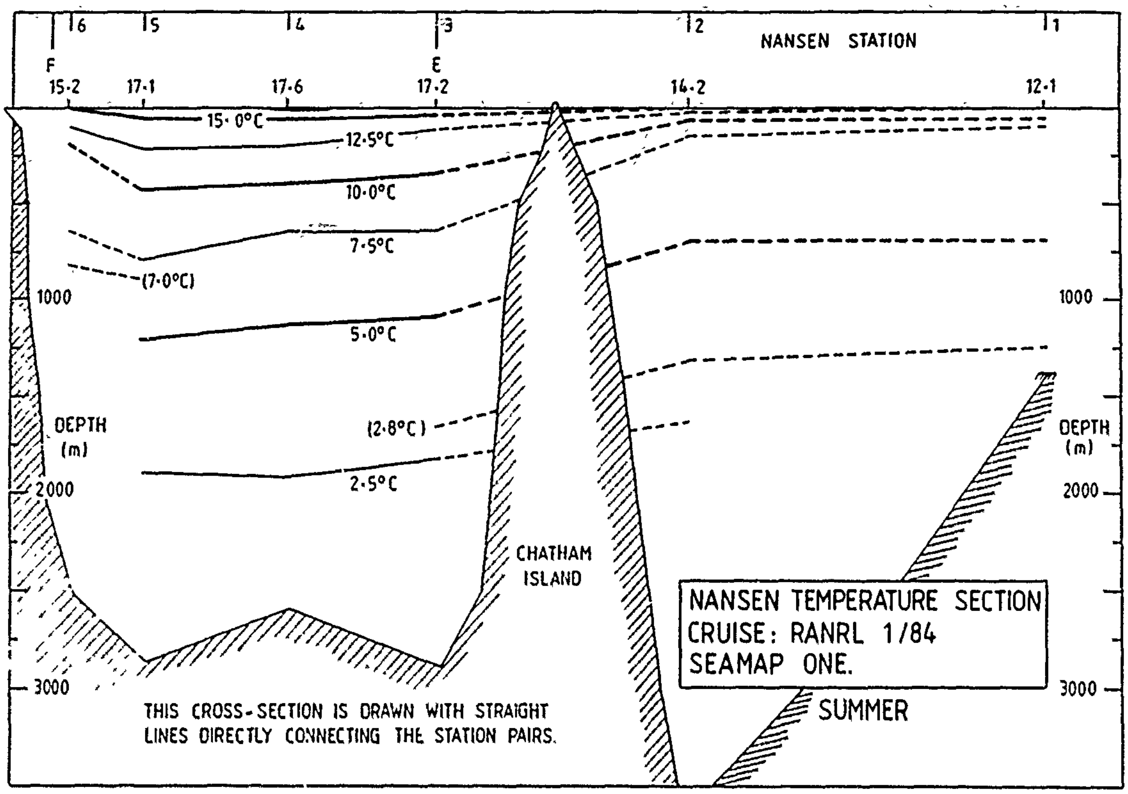


Figure 47. NANSEN temperature section from station 1 to station 6 for 31 January to 8 February 1984. Summer survey SEAMAP 1 (RANRL 1/84) route B. (See figure 44 for more detailed bathymetry from station 3 to station 6)

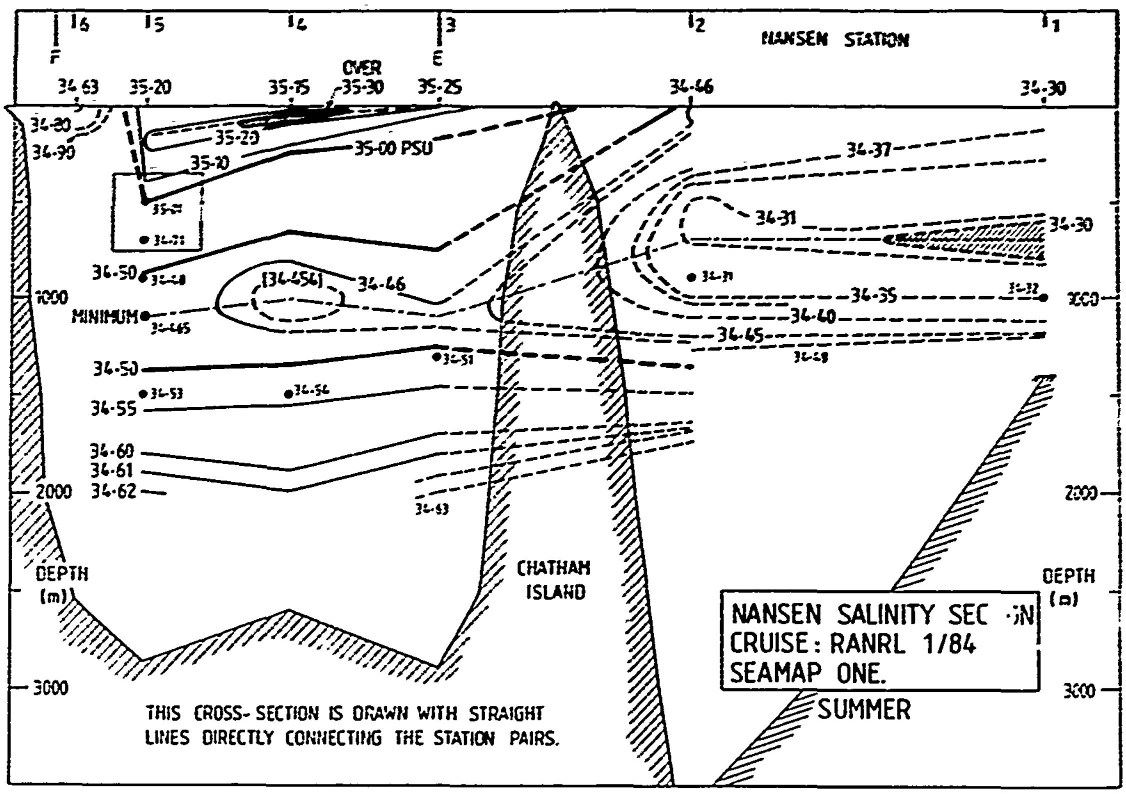
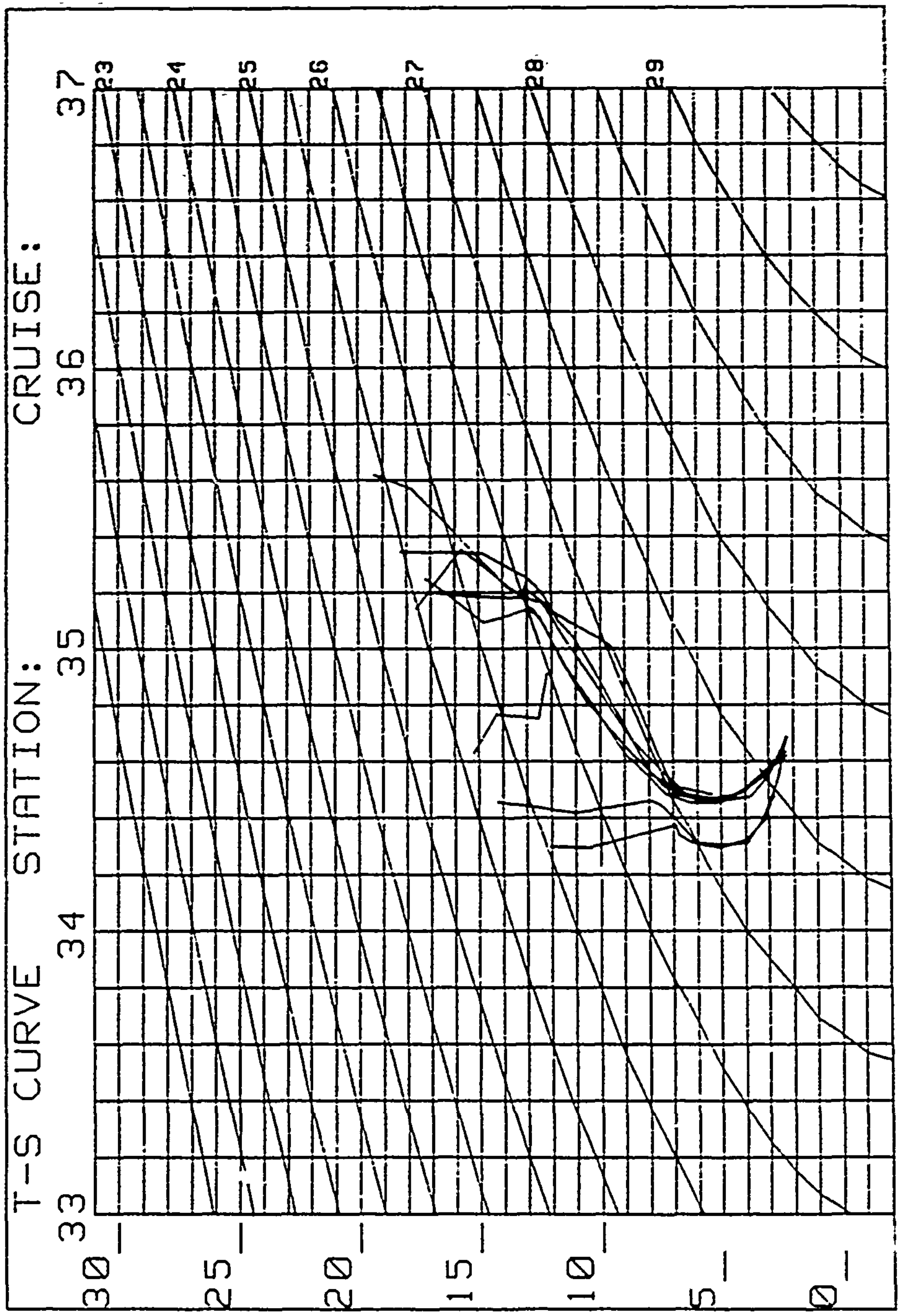


Figure 48. NANSEN salinity section from station 1 to station 6 for 31 January to 8 February 1984. Summer survey SEAMAP 1 (RANRL 1/84) route B. (See figure 44 for more detailed bathymetry from station 3 to station 6)

NANSEN STATION DATA FOR EIGHT STATIONS TAKEN ON SUMMER SURVEY SEAMAP 1 (RANRL 1/84).

A composite temperature - salinity diagram for the stations is given below. The station data are given on following pages.



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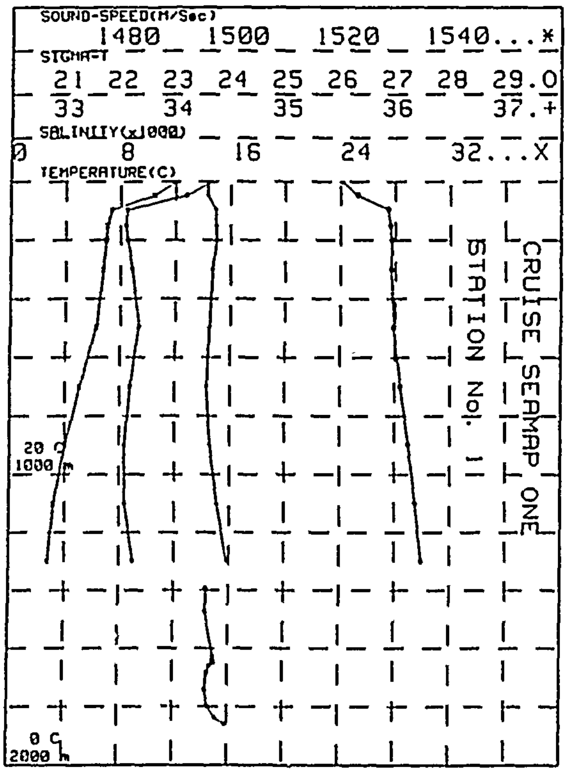
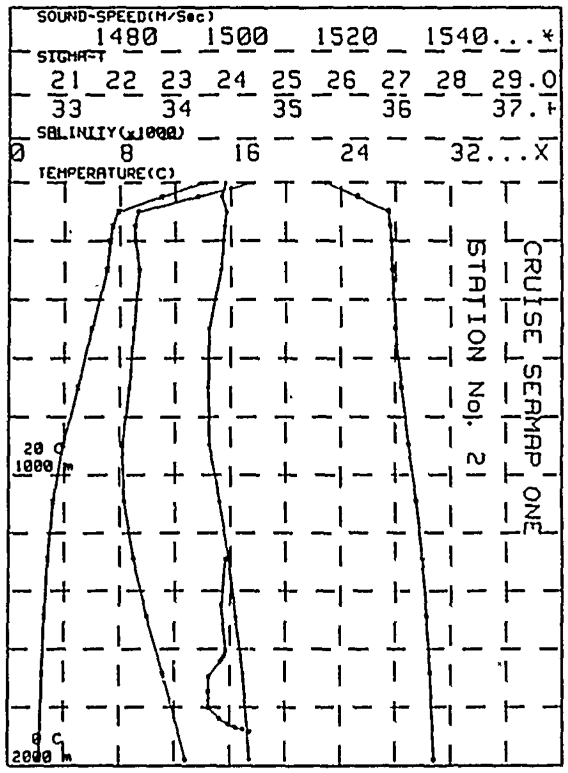
STATION 1 47.17S 173.04E SEAMAP ONE
DATE= 31/01/84 TIME= 2105GMT DEPTH= 1400

	DEPTH m	TEMP °C	SALINITY Ppt	SIGMA-T	A.S.V CL/T	OX ML/L	POT.TEMP °C	S.S M/Sec	Dyn.m
OBS	0	12.070	34.299	26.032	196.7	0.00	12.07	1496.0	
OBS	40	10.500	34.295	26.316	170.7	0.00	10.49	1492.1	
OBS	97	7.360	34.305	26.800	118.8	0.00	7.35	1481.2	
OBS	152	7.070	34.372	26.915	115.2	0.00	7.06	1481.0	
OBS	202	6.950	34.376	26.934	114.1	0.00	6.93	1481.4	
OBS	302	6.770	34.340	26.930	115.8	0.00	6.74	1482.2	
OBS	499	6.280	34.315	26.976	113.9	0.00	6.24	1483.5	
OBS	701	5.090	34.295	27.106	102.6	0.00	5.03	1482.0	
OBS	900	4.020	34.322	27.245	88.5	0.00	3.95	1480.0	
OBS	1103	3.220	34.308	27.376	76.9	0.00	3.14	1481.0	
OBS	1300	2.790	34.417	27.487	66.7	0.00	2.70	1482.6	
ISL	0	12.07	34.30	26.032	196.7	0.00	12.07	1496.0	0.000
ISL	10	11.87	34.30	26.070	193.3	0.00	11.86	1496.3	.019
ISL	25	11.44	34.30	26.140	188.2	0.00	11.44	1495.1	.047
ISL	50	10.32	34.30	26.348	167.7	0.00	10.31	1491.4	.092
ISL	75	8.43	34.34	26.680	136.5	0.00	8.43	1484.9	.130
ISL	100	7.34	34.37	26.872	118.6	0.00	7.33	1481.2	.163
ISL	150	7.08	34.37	26.913	115.3	0.00	7.06	1481.0	.221
ISL	200	6.95	34.38	26.934	114.1	0.00	6.94	1481.3	.279
ISL	250	6.87	34.36	26.932	115.2	0.00	6.85	1481.8	.336
ISL	300	6.77	34.34	26.931	115.6	0.00	6.75	1482.2	.393
ISL	400	6.61	34.33	26.943	114.9	0.00	6.57	1483.2	.509
ISL	500	6.27	34.31	26.976	113.9	0.00	6.23	1483.5	.623
ISL	600	5.67	34.30	27.040	108.5	0.00	5.62	1482.7	.734
ISL	800	4.52	34.30	27.176	96.0	0.00	4.46	1481.3	.930
ISL	1000	3.58	34.35	27.312	83.0	0.00	3.51	1481.0	1.118
ISL	1300	2.70	34.40	27.487	66.7	0.00	2.70	1482.6	1.342

STATION 2 45.45S 178.32W SEAMAP ONE
DATE= 03/02/84 TIME= 0001GMT DEPTH= 4123

	DEPTH m	TEMP °C	SALINITY Ppt	SIGMA-T	A.S.V CL/T	OX ML/L	POT.TEMP °C	S.S M/Sec	Dyn.m
OBS		14.210	34.457	25.724	225.9	0.00	14.21	1504.2	
OBS	50	11.030	34.418	26.317	170.7	0.00	11.02	1494.2	
OBS	101	7.800	34.481	26.887	119.1	0.00	7.80	1483.5	
OBS	151	7.520	34.447	26.910	115.8	0.00	7.51	1482.8	
OBS	202	7.320	34.433	26.920	114.9	0.00	7.30	1482.9	
OBS	300	7.120	34.415	26.942	115.9	0.00	7.09	1483.7	
OBS	498	6.070	34.311	26.980	111.4	0.00	6.03	1482.7	
OBS	702	5.040	34.305	27.120	101.2	0.00	4.98	1481.8	
OBS	897	3.930	34.313	27.247	88.1	0.00	3.86	1480.5	
OBS	1002	3.220	34.402	27.387	75.8	0.00	3.14	1480.9	
OBS	1291	2.830	34.404	27.400	66.5	0.00	2.74	1482.0	
OBS	1400	2.600	34.551	27.582	60.1	0.00	2.50	1485.1	
OBS	1805	2.400	34.622	27.631	54.3	0.00	2.34	1487.9	
OBS	1979	2.200	34.683	27.887	40.8	0.00	2.12	1492.1	
ISL	0	14.21	34.46	25.724	225.9	0.00	14.21	1504.2	0.000
ISL	10	13.57	34.44	25.847	214.5	0.00	13.56	1502.2	.022
ISL	25	12.61	34.43	26.027	197.7	0.00	12.60	1499.2	.053
ISL	50	11.03	34.42	26.317	170.7	0.00	11.02	1494.2	.090
ISL	75	9.14	34.45	26.651	138.3	0.00	9.13	1487.8	.139
ISL	100	7.92	34.46	26.881	118.7	0.00	7.91	1483.8	.172
ISL	150	7.53	34.45	26.909	115.8	0.00	7.51	1482.8	.231
ISL	200	7.33	34.43	26.927	114.9	0.00	7.31	1482.9	.288
ISL	250	7.25	34.43	26.933	114.9	0.00	7.22	1483.4	.348
ISL	300	7.12	34.42	26.942	115.0	0.00	7.09	1483.7	.403
ISL	400	6.58	34.35	26.984	114.0	0.00	6.55	1483.1	.517
ISL	500	6.06	34.31	27.001	111.4	0.00	6.02	1482.6	.630
ISL	600	5.57	34.31	27.058	106.6	0.00	5.52	1482.3	.739
ISL	800	4.43	34.31	27.182	95.3	0.00	4.37	1480.9	.941
ISL	1000	3.51	34.38	27.328	81.5	0.00	3.44	1480.5	1.118
ISL	1300	2.82	34.48	27.492	66.2	0.00	2.73	1482.7	1.338
ISL	1900	2.59	34.58	27.587	59.7	0.00	2.49	1485.2	1.484



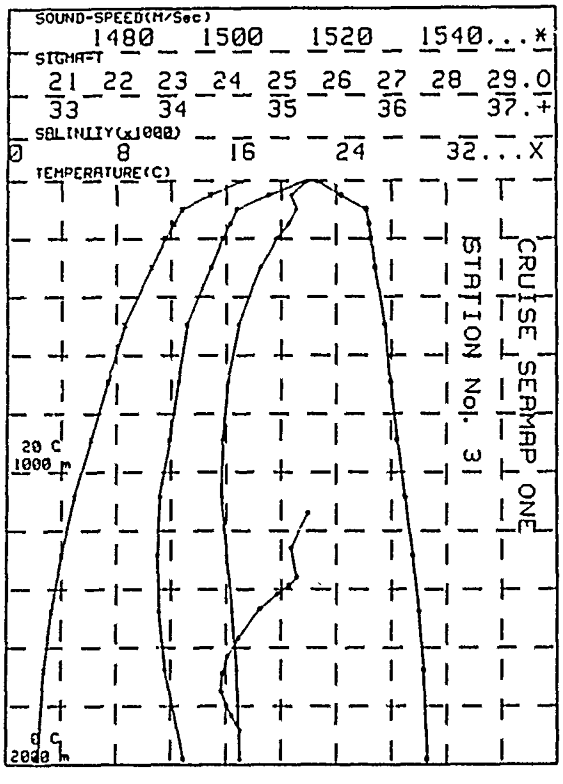


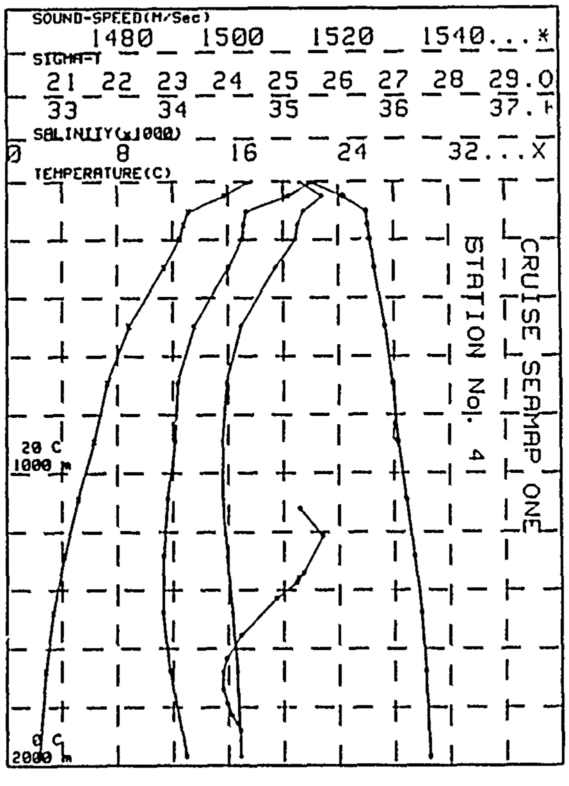
STATION 3 41.59S 175.07W SEAMAP ONE
DATE= 05/02/84 TIME= 2135GMT DEPTH= 2000

	DEPTH m	TEMP °C	SALINITY Ppt	SIGMA-T	A.S.V CL/T	OX ML/L	POT.TEMP °C	S.S M/Sec	Dyn.m
OBS	0	17.190	35.250	25.082	231.8	0.00	17.19	1514.4	
OBS	50	14.800	35.092	26.087	192.8	0.00	14.79	1507.7	
OBS	100	12.800	35.143	26.544	150.8	0.00	12.79	1502.0	
OBS	150	12.230	35.070	26.800	146.5	0.00	12.21	1500.8	
OBS	200	11.610	34.981	26.833	144.4	0.00	11.58	1499.4	
OBS	300	10.610	34.816	26.703	138.7	0.00	10.57	1497.3	
OBS	496	8.620	34.820	26.881	125.3	0.00	8.57	1492.9	
OBS	693	7.390	34.515	26.982	117.6	0.00	7.32	1491.4	
OBS	890	6.200	34.470	27.100	108.8	0.00	6.12	1490.9	
OBS	1087	4.930	34.450	27.254	92.8	0.00	4.84	1488.0	
OBS	1286	4.020	34.505	27.388	79.3	0.00	3.92	1487.8	
OBS	1479	3.300	34.556	27.503	68.1	0.00	3.19	1487.9	
OBS	1679	2.700	34.803	27.590	59.3	0.00	2.64	1489.0	
OBS	1902	2.330	34.833	27.851	53.4	0.00	2.18	1492.4	
ISL	0	17.19	35.25	25.082	231.8	0.00	17.19	1514.4	0.000
ISL	10	16.88	35.29	25.744	224.3	0.00	16.88	1513.0	.023
ISL	25	15.95	35.14	25.871	212.7	0.00	15.94	1510.9	.058
ISL	50	14.80	35.09	26.087	192.8	0.00	14.79	1507.7	.108
ISL	75	13.82	35.13	26.308	16'.C	0.00	13.81	1504.3	.152
ISL	100	12.89	35.14	26.544	150.8	0.00	12.79	1502.0	.192
ISL	150	12.23	35.07	26.800	146.5	0.00	12.21	1500.8	.286
ISL	200	11.61	34.98	26.833	144.4	0.00	11.58	1499.4	.330
ISL	250	11.11	34.88	26.886	142.3	0.00	11.08	1498.3	.411
ISL	300	10.61	34.82	26.703	138.7	0.00	10.57	1497.3	.481
ISL	400	9.50	34.70	26.803	131.5	0.00	9.45	1494.7	.617
ISL	500	8.59	34.62	26.883	125.2	0.00	8.54	1492.9	.746
ISL	600	7.97	34.56	26.931	121.7	0.00	7.90	1492.1	.888
ISL	800	6.75	34.49	27.049	112.0	0.00	6.67	1490.6	1.103
ISL	1000	5.44	34.46	27.191	98.7	0.00	5.38	1488.8	1.314
ISL	1300	3.98	34.51	27.399	78.4	0.00	3.86	1487.8	1.578
ISL	1500	3.23	34.56	27.514	67.0	0.00	3.12	1488.0	1.725

STATION 4 41.55S 178.59W SEAMAP ONE
DATE= 07/02/84 TIME= 0004GMT DEPTH= 2590

	DEPTH m	TEMP °C	SALINITY Ppt	SIGMA-T	A.S.V CL/T	OX ML/L	POT.TEMP °C	S.S M/Sec	Dyn.m
OBS	0	17.590	35.145	25.405	240.7	0.00	17.59	1515.5	
OBS	51	15.710	35.354	26.007	193.8	0.00	15.70	1510.9	
OBS	105	13.150	35.181	26.504	154.7	0.00	13.14	1503.3	
OBS	150	12.810	35.130	26.532	153.1	0.00	12.79	1502.9	
OBS	199	12.530	35.114	26.575	150.2	0.00	12.50	1502.7	
OBS	297	11.380	34.932	26.652	144.9	0.00	11.35	1500.1	
OBS	497	8.870	34.617	26.838	129.5	0.00	8.82	1493.9	
OBS	694	7.270	34.404	26.975	118.1	0.00	7.20	1490.9	
OBS	893	6.340	34.494	27.078	109.8	0.00	6.26	1490.5	
OBS	1090	5.180	34.494	27.222	96.2	0.00	5.09	1489.1	
OBS	17'8	4.190	34.488	27.380	82.8	0.00	4.09	1488.3	
OBS	? 78	3.380	34.537	27.488	70.4	0.00	3.27	1488.2	
OBS	1670	2.800	34.581	27.563	62.1	0.00	2.74	1489.4	
OBS	1908	2.400	34.611	27.627	55.8	0.00	2.28	1492.4	
ISL	0	17.59	35.14	25.405	240.7	0.00	17.58	1515.5	0.000
ISL	10	17.28	35.21	25.619	236.3	0.00	17.28	1514.8	.024
ISL	25	16.73	35.29	25.805	219.8	0.00	16.73	1513.5	.059
ISL	50	15.75	35.35	26.077	193.9	0.00	15.74	1511.0	.111
ISL	75	14.28	35.26	26.324	171.1	0.00	14.27	1506.8	.157
ISL	100	13.29	35.19	26.482	156.8	0.00	13.27	1503.7	.199
ISL	150	12.81	35.13	26.532	153.1	0.00	12.79	1502.9	.276
ISL	200	12.52	35.11	26.576	150.2	0.00	12.49	1502.7	.352
ISL	250	11.94	35.02	26.614	147.8	0.00	11.91	1501.4	.426
ISL	300	11.35	34.93	26.695	144.6	0.00	11.31	1500.0	.499
ISL	400	9.98	34.75	26.755	136.5	0.00	9.93	1496.5	.640
ISL	500	8.84	34.61	26.842	129.3	0.00	8.79	1493.8	.773
ISL	600	7.95	34.53	26.914	123.2	0.00	7.89	1492.0	.899
ISL	800	6.80	34.46	27.024	114.4	0.00	6.73	1490.8	1.136
ISL	1000	5.00	34.45	27.158	102.5	0.00	5.00	1489.0	1.353
ISL	1300	4.12	34.49	27.370	81.8	0.00	4.02	1488.3	1.630
ISL	1500	3.32	34.54	27.491	69.4	0.00	3.20	1488.3	1.780



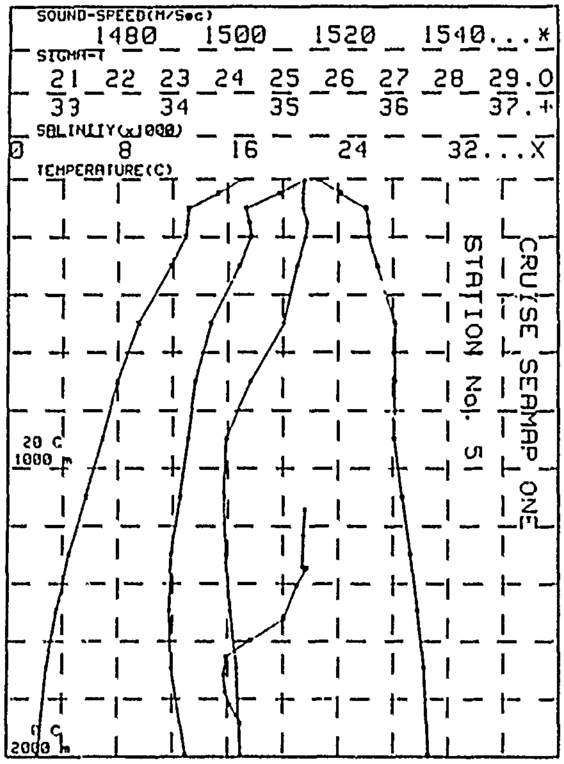


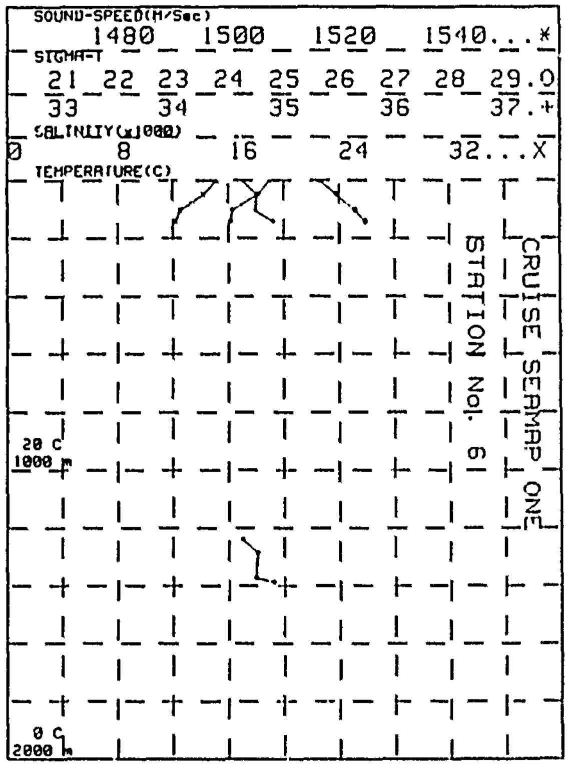
STATION 5 42.04S 177.31E SEAMAP ONE
DATE= 8/2/84 TIME= 0050GMT DEPTH= 2000

	DEPTH m	TEMP °C	SALINITY Ppt	SIGMA-T	A.S.V CL/T	OX ML/L	POT.TEMP °C	S.S M/Sec	Dyn.m
OBS	0	17.110	35.199	25.842	233.7	0.00	17.11	1514.1	
OBS	50	15.300	35.187	26.051	190.4	0.00	15.29	1509.4	
OBS	103	13.140	35.181	26.508	154.5	0.00	13.13	1503.3	
OBS	152	13.060	35.223	26.554	151.1	0.00	13.04	1503.8	
OBS	202	12.940	35.208	26.585	151.4	0.00	12.91	1504.2	
OBS	302	11.880	35.127	26.715	139.3	0.00	11.82	1502.1	
OBS	500	9.530	35.009	27.030	111.5	0.00	9.47	1496.9	
OBS	701	8.010	34.708	27.043	112.9	0.00	7.94	1494.1	
OBS	898	6.910	34.483	27.024	116.0	0.00	6.82	1492.0	
OBS	1101	5.890	34.489	27.109	102.5	0.00	5.80	1491.3	
OBS	1299	4.490	34.481	27.321	87.3	0.00	4.38	1488.8	
OBS	1494	3.600	34.525	27.449	74.2	0.00	3.48	1489.4	
OBS	1694	2.880	34.505	27.505	82.2	0.00	2.78	1488.8	
OBS	1993	2.300	34.620	27.643	54.0	0.00	2.18	1492.4	
ISL	0	17.11	35.20	25.842	233.7	0.00	17.11	1514.1	0.000
ISL	10	16.77	35.20	25.722	228.4	0.00	16.76	1513.3	.023
ISL	25	16.23	35.19	25.844	215.3	0.00	16.23	1511.9	.058
ISL	50	15.30	35.19	26.051	190.4	0.00	15.29	1509.4	.108
ISL	75	14.01	35.18	26.317	171.6	0.00	14.00	1505.6	.154
ISL	100	13.20	35.18	26.491	155.8	0.00	13.19	1503.4	.198
ISL	150	13.06	35.22	26.553	151.2	0.00	13.04	1503.8	.272
ISL	200	12.95	35.21	26.564	151.4	0.00	12.92	1504.2	.348
ISL	250	12.43	35.17	26.638	145.7	0.00	12.40	1503.3	.422
ISL	300	11.88	35.13	26.712	139.5	0.00	11.84	1502.2	.494
ISL	400	10.60	35.09	26.915	121.9	0.00	10.55	1499.2	.628
ISL	500	9.53	35.01	27.030	111.5	0.00	9.47	1496.9	.749
ISL	600	8.72	34.85	27.041	112.0	0.00	8.66	1495.3	.858
ISL	800	7.47	34.57	27.034	114.5	0.00	7.39	1493.5	1.083
ISL	1000	6.30	34.47	27.095	109.5	0.00	6.20	1492.1	1.310
ISL	1300	4.48	34.48	27.322	87.2	0.00	4.38	1489.8	1.608
ISL	1500	3.57	34.53	27.453	73.8	0.00	3.46	1489.4	1.707

STATION 6 42.08S 175.40E SEAMAP ONE
DATE= 08/02/84 TIME= 1630GMT DEPTH= 2532

	DEPTH m	TEMP °C	SALINITY Ppt	SIGMA-T	A.S.V CL/T	OX ML/L	POT.TEMP °C	S.S M/Sec	Dyn m
OBS	0	15.180	34.830	25.648	233.1	0.00	15.18	1507.5	
OBS	50	14.270	34.780	25.951	205.7	0.00	14.26	1505.6	
OBS	105	12.540	34.750	26.291	174.7	0.00	12.53	1500.7	
OBS	144	12.210	34.900	26.479	157.9	0.00	12.19	1500.4	
ISL	0	15.18	34.83	25.648	233.1	0.00	15.18	1507.5	0.000
ISL	10	15.05	34.87	25.708	227.7	0.00	15.05	1507.3	.023
ISL	25	14.88	34.72	25.790	219.5	0.00	14.88	1506.8	.057
ISL	50	14.27	34.77	25.951	205.7	0.00	14.26	1505.6	.110
ISL	75	13.30	34.76	26.117	190.8	0.00	13.29	1502.7	.159
ISL	100	12.64	34.75	26.204	177.2	0.00	12.62	1501.0	.206



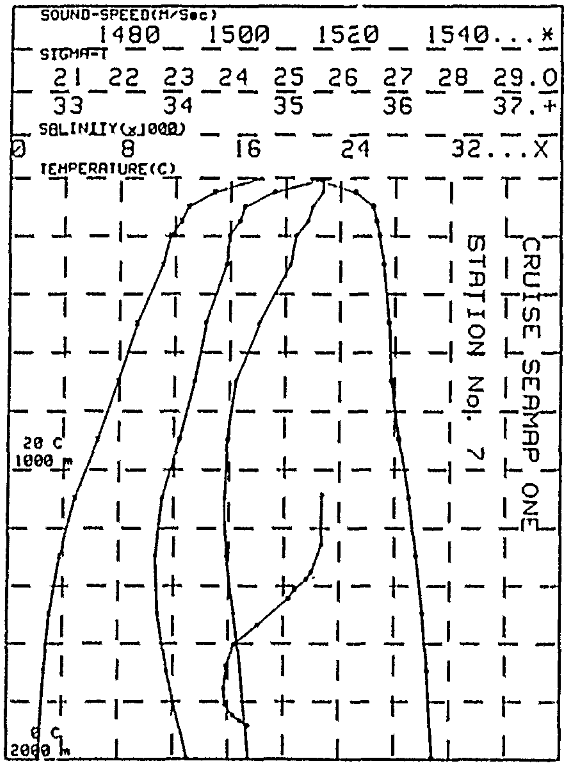


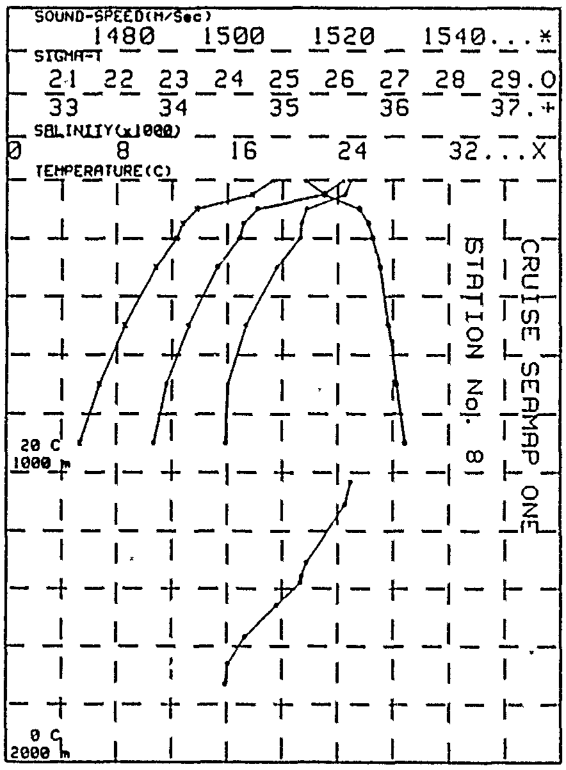
STATION 7 40.01S 155.20E SEAMAP ONE
DATE= 16/02/84 TIME= 0114GMT DEPTH= 4805

	DEPTH m	TEMP °C	SALINITY Ppt	SIGMA-T	A.S.V CL/T	OX ML/L	POT.TEMP °C	S.S M/Sec	Dyn.m
OBS	0	18.250	35.345	25.475	249.5	0.00	18.25	1517.6	
OBS	50	14.810	35.339	26.276	175.0	0.00	14.80	1508.0	
OBS	100	12.920	35.247	26.601	145.3	0.00	12.91	1502.6	
OBS	150	12.440	35.203	26.662	140.7	0 00	12.42	1501.7	
OBS	200	11.710	35.098	26.721	136.2	0.00	11.68	1499.9	
OBS	300	11.100	35.043	26.791	131.6	0.00	11.06	1499.3	
OBS	500	9.200	34.780	26.895	124.7	0.00	9.20	1495.6	
OBS	700	7.930	34.556	26.938	122.9	0.00	7.86	1493.6	
OBS	897	6.400	34.402	27.084	109.5	0.00	6.30	1491.0	
OBS	1097	4.880	34.403	27.206	91.4	0.00	4.77	1487.9	
OBS	1297	3.750	34.478	27.395	78.1	0.00	3.65	1486.5	
OBS	14[illegible]	3.040	34.548	27.521	65.6	0.00	2.93	1487.1	
OBS	1697	2.650	34.612	27.687	57.4	0.00	2.53	1488.0	
OBS	1996	2.300	34.685	27.805	40.3	0.00	2.18	1492.5	
ISL	0	18.25	35.34	25.475	249.5	0.00	18.25	1517.6	0.000
ISL	10	17.44	35.34	25.674	231.0	0.00	17.44	1515.4	.024
ISL	25	16.34	35.34	25.935	206.6	0.00	16.33	1512.3	.050
ISL	50	14.81	35.34	26.276	175.0	0.00	14.80	1508.0	.108
ISL	75	13.60	35.29	26.471	157.0	0.00	13.60	1504.7	.148
ISL	100	12.92	35.25	26.601	145.3	0.00	12.91	1502.8	.188
ISL	150	12.44	35.20	26.662	140.7	0.00	12.42	1501.7	.258
ISL	200	11.71	35.10	26.721	136.2	0.00	11.68	1499.9	.327
ISL	250	11.43	35.08	26.758	133.6	0.00	11.40	1499.7	.394
ISL	300	11.10	35.04	26.791	131.6	0.00	11.06	1499.3	.461
ISL	400	10.12	34.90	26.851	127.5	0.00	10.07	1497.2	.591
ISL	500	9.26	34.77	26.895	124.7	0.00	9.20	1495.6	.717
ISL	600	8.62	34.64	26.902	123.8	0.00	8.55	1494.7	.841
ISL	800	7.20	34.51	27.007	116.6	0.00	7.12	1492.4	1.084
ISL	1000	5.57	34.47	27.184	99.6	0.00	5.49	1489.2	1.302
ISL	1300	3.74	34.48	27.397	77.9	0.00	3.64	1486.6	1.506
ISL	1500	3.03	34.55	27.522	65.4	0.00	2.92	1487.1	1.710

STATION 8 38.37S 148.52E SEAMAP ONE
DATE= 18/2/84 TIME= 0001GMT DEPTH= 2755

	DEPTH m	TEMP °C	SALINITY Ppt	SIGMA-T	A.S.V CL/T	OX ML/L	POT.TEMP °C	S.S M/Sec	Dyn.m
OBS	0	19.320	35.618	25.412	255.5	0.00	19.32	1521.0	
OBS	50	17.800	35.568	25.758	224.4	0.00	17.79	1517.4	
OBS	100	13.810	35.219	26.307	164.0	0.00	13.80	1505.5	
OBS	150	12.830	35.173	26.502	150.3	0.00	12.81	1503.0	
OBS	200	12.380	35.164	26.642	143.9	0.00	12.36	1502.3	
OBS	300	10.820	34.951	26.770	133.4	0 00	10.78	1498.2	
OBS	500	8.620	34.667	26.918	121.9	0.06	8.57	1493.1	
OBS	700	6.770	34.507	27.062	109.3	0.00	6.70	1489.0	
OBS	900	5.380	34.403	27.221	94.8	0.00	5.30	1486.8	
ISL	0	19.32	35.62	25.412	255.5	0.00	19.32	1521.0	0.000
ISL	10	19.21	35.61	25.458	251.6	0.00	19.21	1520.9	.025
ISL	25	18.87	35.58	25.548	243.5	0.00	18.86	1520.2	.062
ISL	50	17.80	35.57	25.758	224.4	0.00	17.79	1517.4	.120
ISL	75	15.43	35.38	26.137	188.9	0.00	15.42	1510.3	.172
ISL	100	13.81	35.22	26.307	164.0	0.00	13.80	1505.5	.217
ISL	150	12.83	35.17	26.502	150.3	0.00	12.81	1503.0	.296
ISL	200	12.38	35.16	26.642	143.9	0.00	12.36	1502.3	.370
ISL	250	11.57	35.05	26.711	138.3	0.00	11.53	1500.1	.440
ISL	300	10.82	34.95	26.770	133.4	0.00	10.78	1498.2	.508
ISL	400	9.68	34.78	26.844	127.6	0.00	9.63	1495.5	.639
ISL	500	8.62	34.67	26.918	121.9	0.00	8.57	1493.1	.764
ISL	600	7.64	34.57	26.988	115.9	0.00	7.58	1490.8	.882
ISL	800	6.02	34.49	27.140	102.2	0.00	5.95	1487.7	1.100





DATA FOR SUMMER SURVEY SEAMAP 5 (RANRL 18/87) ARE PRESENTED ON FOLLOWING PAGES.

SURVEY SEAMAP 5 WAS CONDUCTED IN FEBRUARY 1987

Text continued on page 111

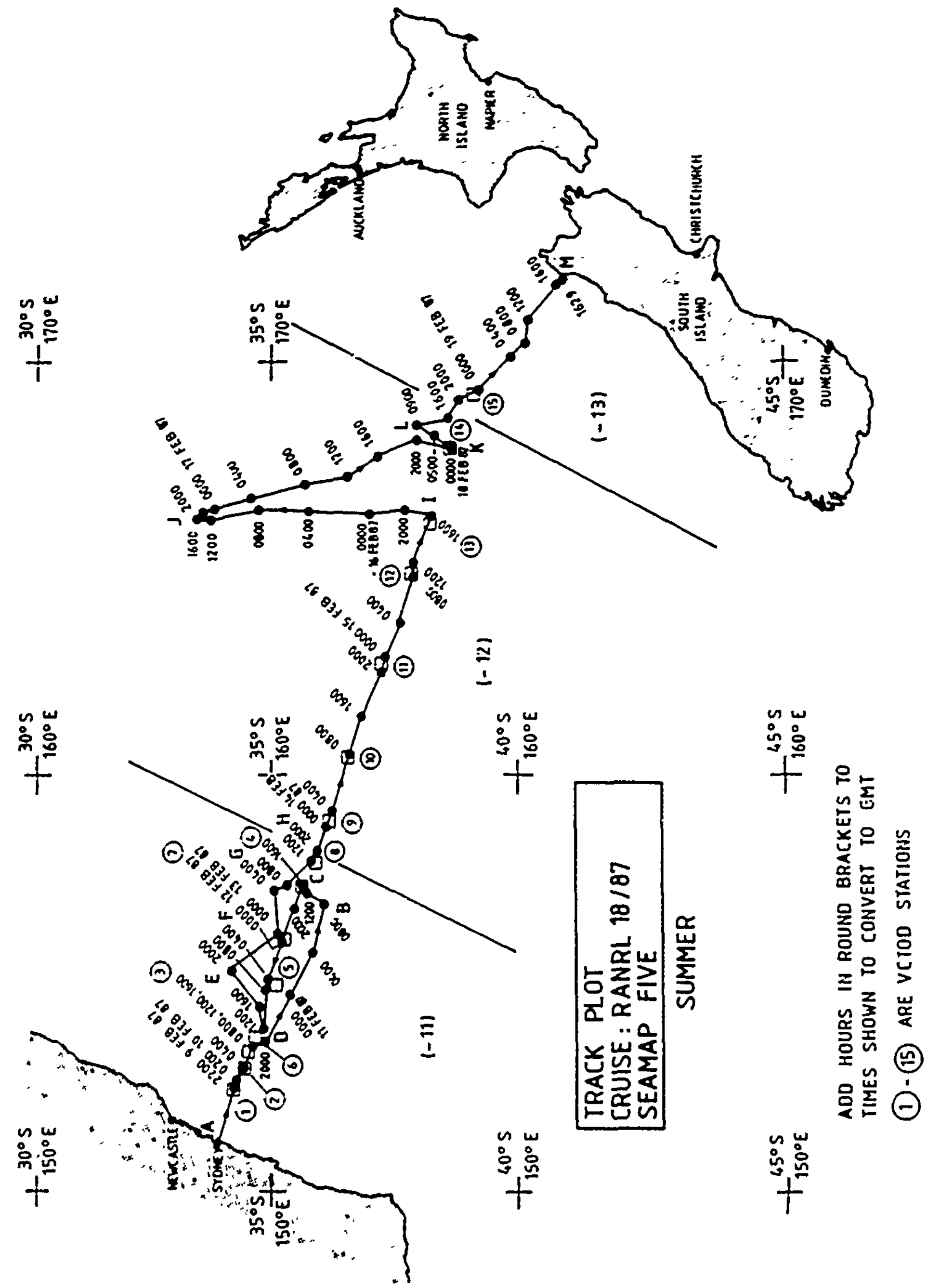


Figure 49. Track plot and oceanographic station positions for SEAMAP 5 (RANRL 18/87) summer survey on route B in the south west Pacific Ocean, 9 to 19 February 1987

Data for SEAMAP survey five (RANRL 18/87) - route B - summer

Oceanographic data are presented for a cruise made in southern hemisphere oceanographic summer (February 1987) from Sydney to Cook Strait, New Zealand (figure 49). Acoustic and geophysical data for the cruise are given in other sources (see Appendix II). The survey, designated as RANRL 18/87, and SEAMAP 5, was the fifth of the project SEAMAP surveys made on the naval oceanographic research vessel HMAS COOK. This survey completes route B for summer. The remainder of route B was traversed on SEAMAP 1 (RANRL 1/84), discussed in the previous section.

Data for the winter counterpart of this summer leg of route B, designated as RANRL 17/86 (SEAMAP 4), will be given in a following report.

Surface parameters

Sea state, swell height, and wind vectors

Four-hourly observations are shown in figures 50 and 51. Table 1 shows sea conditions associated with the sea state values. Sea states of 2 and 3, with winds of 15 kn to 18 kn or less were encountered from Sydney to 169°E (smooth to slight conditions), with a period of moderate seas (sea state 4) about 155°E. Sea states 4 and 5 with 2 m swell and 20 kn winds occurred approaching New Zealand (moderate to rough seas). Westerly winds occurred from 160°E to New Zealand, with easterly winds before 160°E.

Sea surface temperature and salinity

Sea surface temperature (SST)

From SST data of figure 52, speculative sea surface contours can be drawn (figure 53) for much of the cruise track, which correspond quite well to features seen in XBT sections (figures 58 and 60). Frontal activity occurs from waypoints A to G where the higher temperature waters of the East Australian Current are crossed. Meandering of contours is then seen, particularly about waypoint I. Coolest waters are seen on the New Zealand coastline, associated with a weak front. The contours help to resolve indistinct features in a CSIDA (CSIRO Division of Atmospheric Research) satellite image of 7 February 1987 for Australia to 156°E (figure 54). Two RMC maps are available from 165°E to 180°E for 16 and 23 February 1987 (figure 55). The map for 16 February agrees roughly with the SST contours.

Text continued on page 122

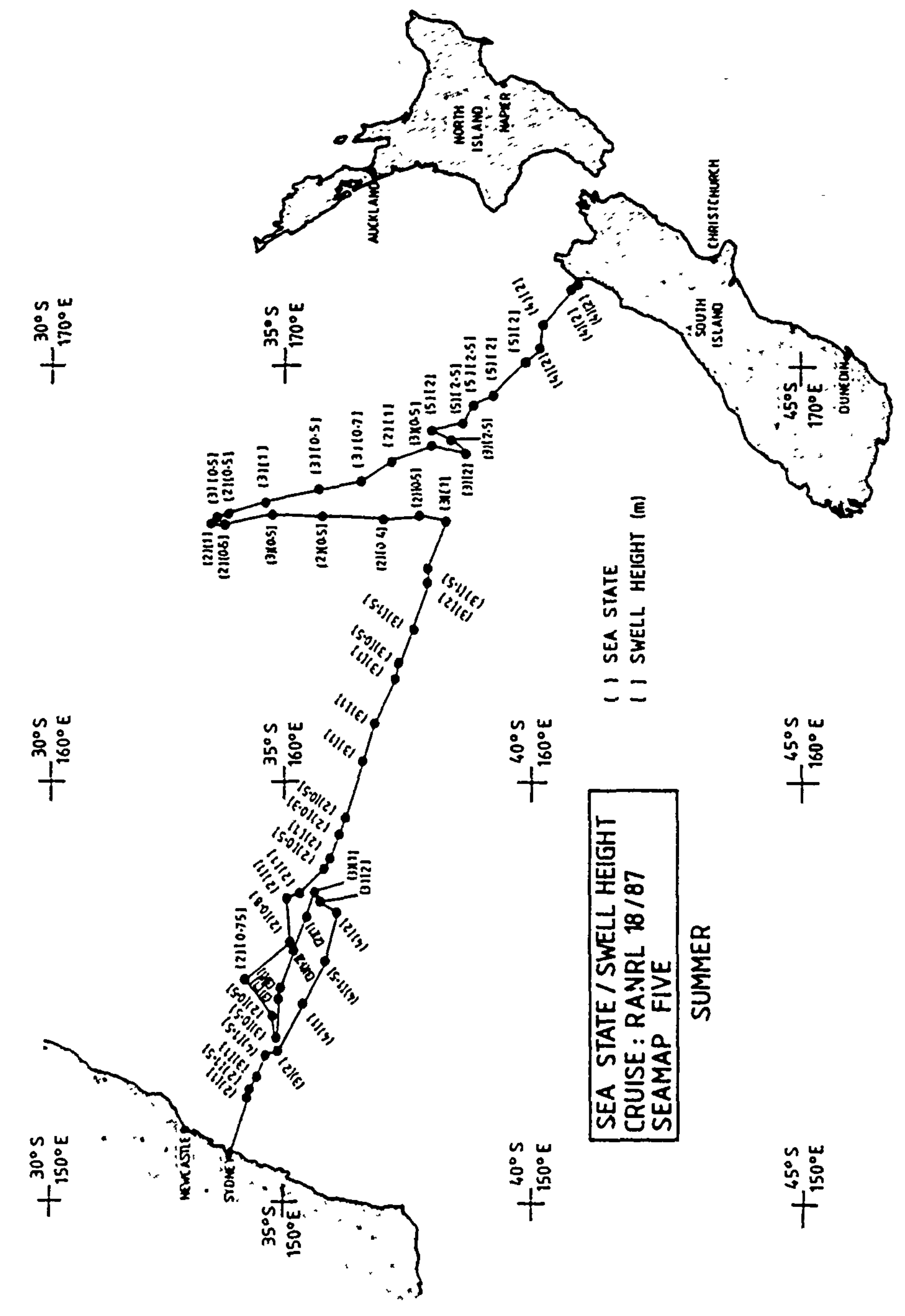


Figure 50. Sea state and swell height for SEAMAP route B in summer 1987 on survey SEAMAP 5 (RANRL 18/87)

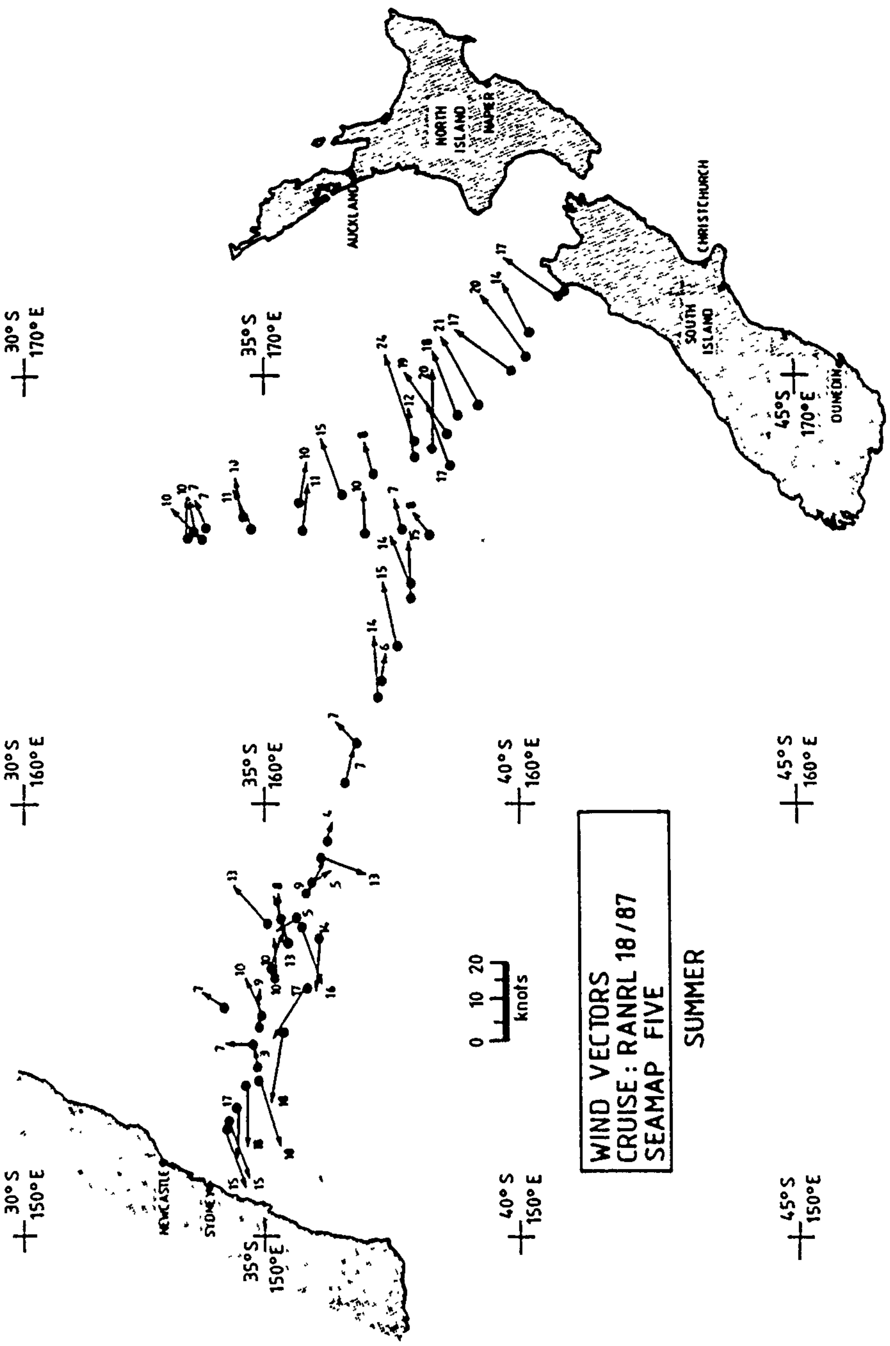


Figure 51. Wind vectors for SEAMAP route B in summer 1987 on survey SEAMAP 5 (RANRL 18/87)

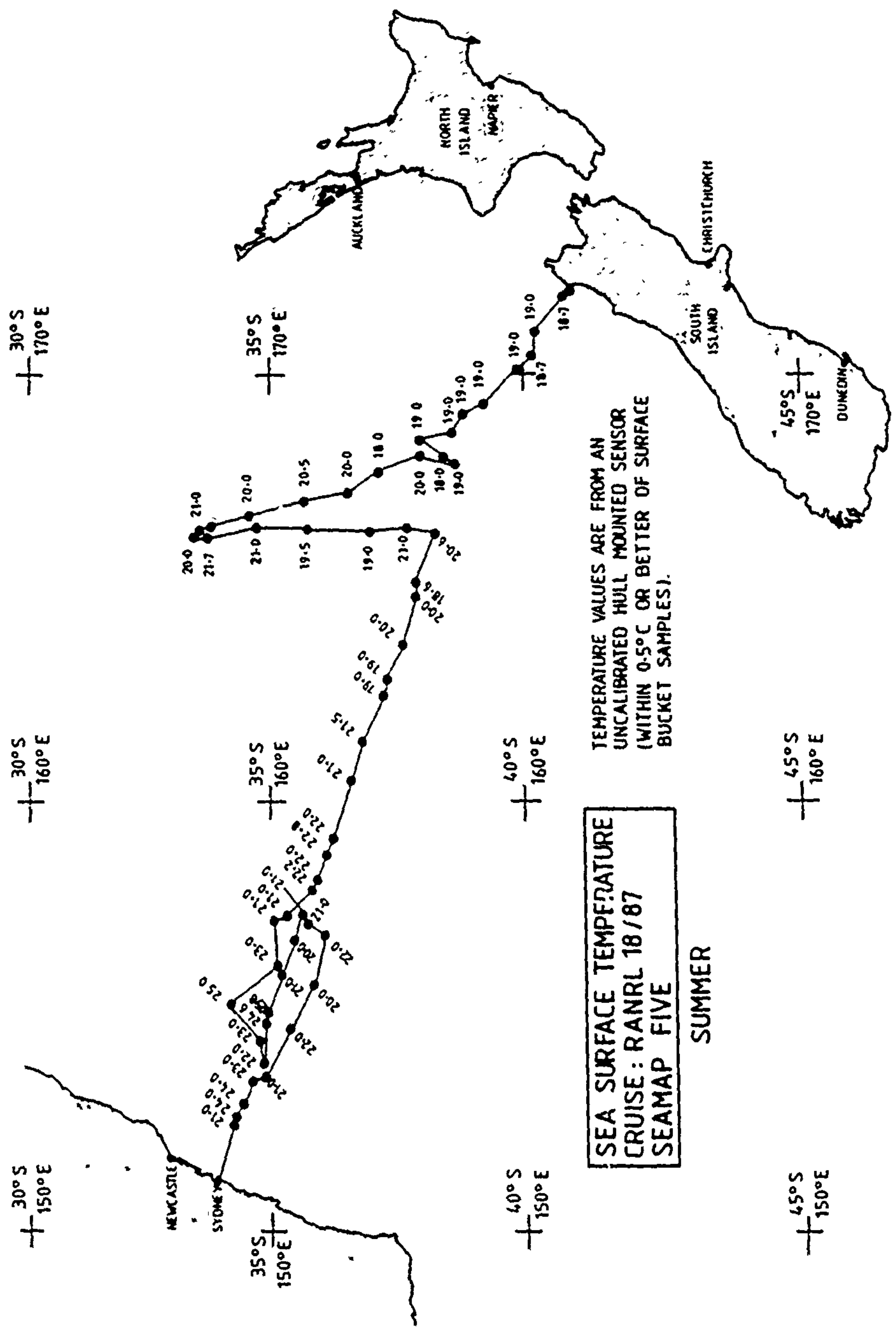


Figure 52. Sea surface temperature values for SEAMAP route B in summer 1987 on survey SEAMAP 5 (RANRL 18/87)

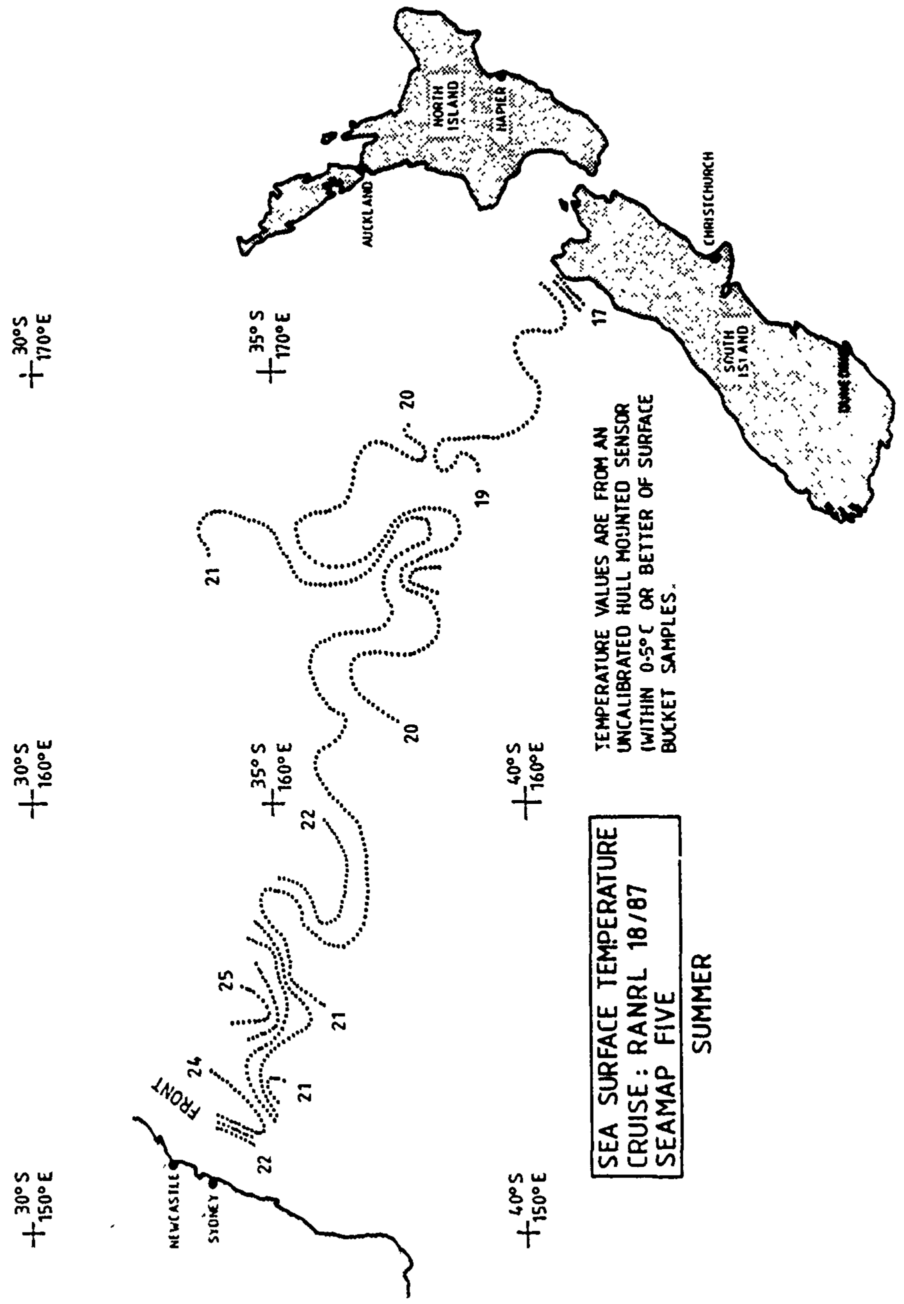


Figure 53. Sea surface temperature contours for SEAMAP route B in summer 1987 on survey SEAMAP 5 (RANRL 18/87)

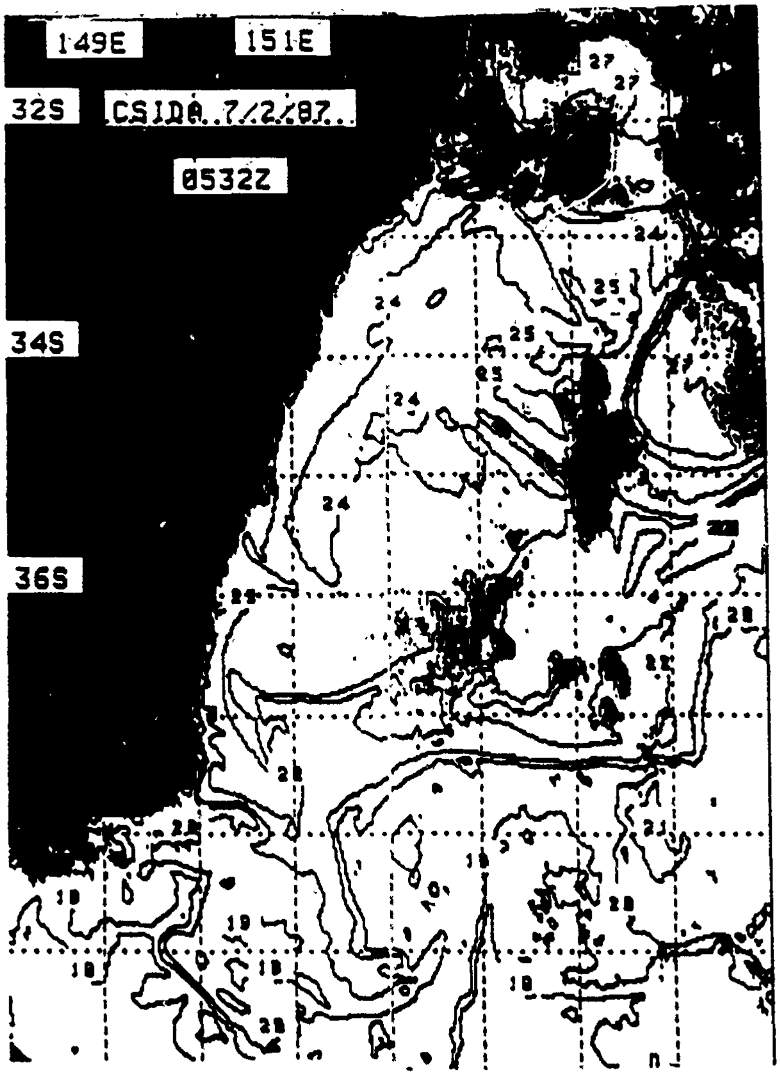


Figure 54. Sea surface temperature contours derived by CSIRO Division of Atmospheric Research, Aspendale Victoria from satellite data for 7 February 1987. Coinciding with sections of SEAMAP 5 summer survey (RANRL 18/87) route A

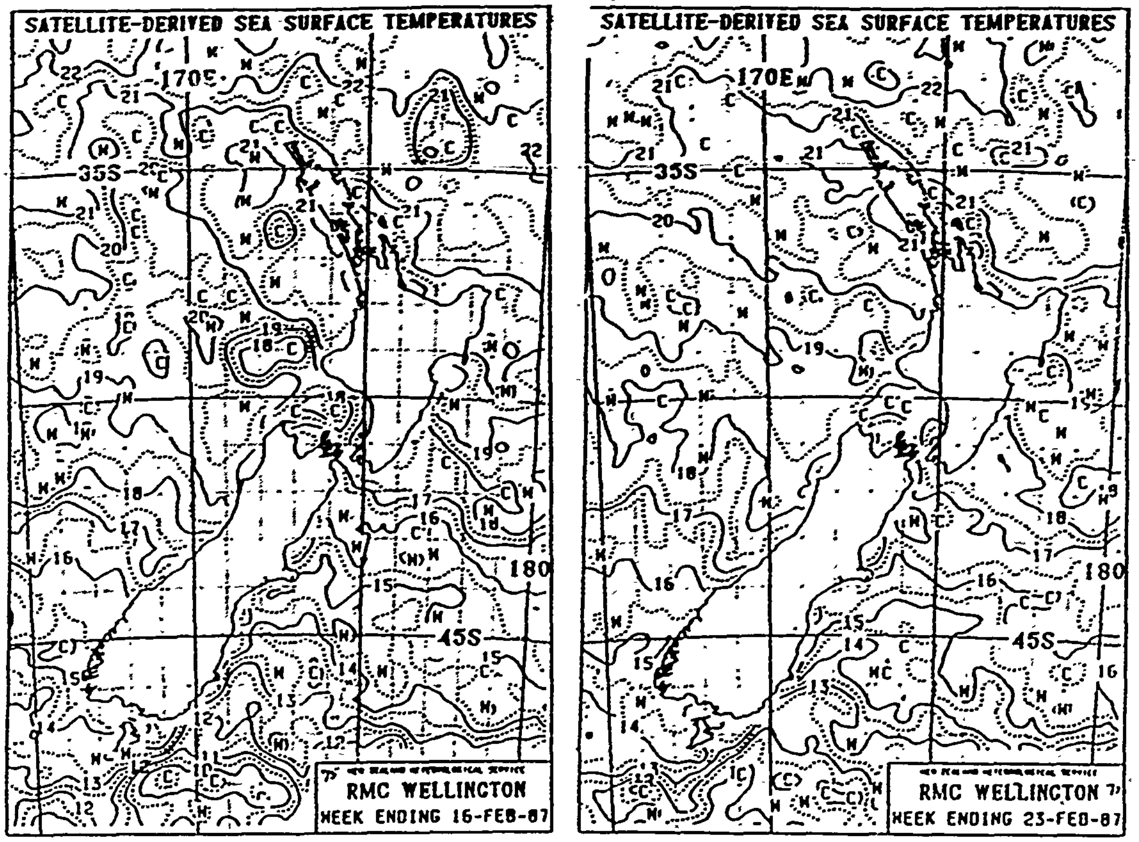


Figure 55. Sea surface temperature contours derived by Royal Metorological Centre Wellington, New Zealand from satellite data for 16, 23 February 1987. Coinciding with SEAMAP 5 summer survey (RANRL 18/87) route A

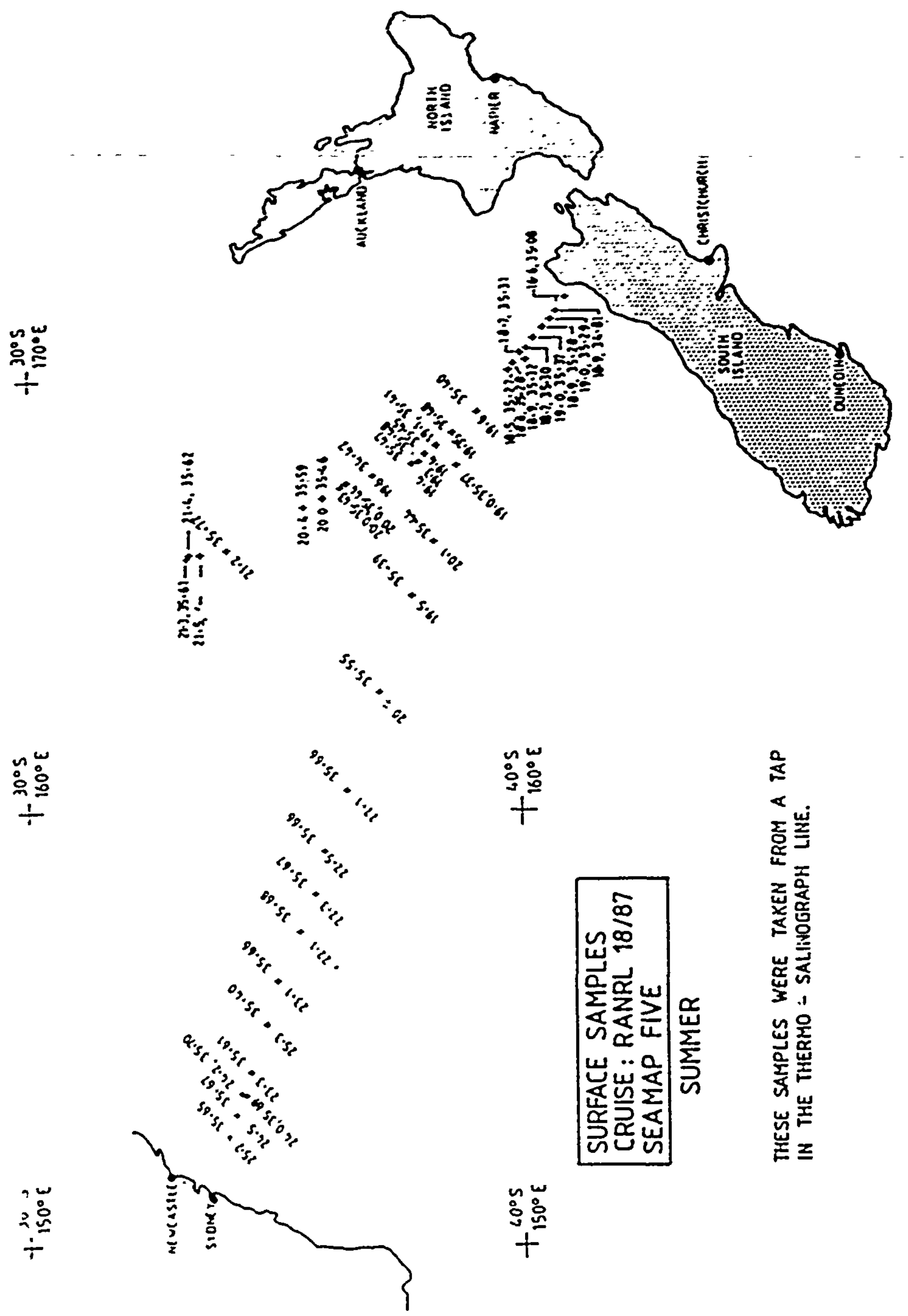


Figure 56. Sea surface salinity values for SEAMAP route B in summer 1987 on survey SEAMAP 5 (RANRL 18/87)

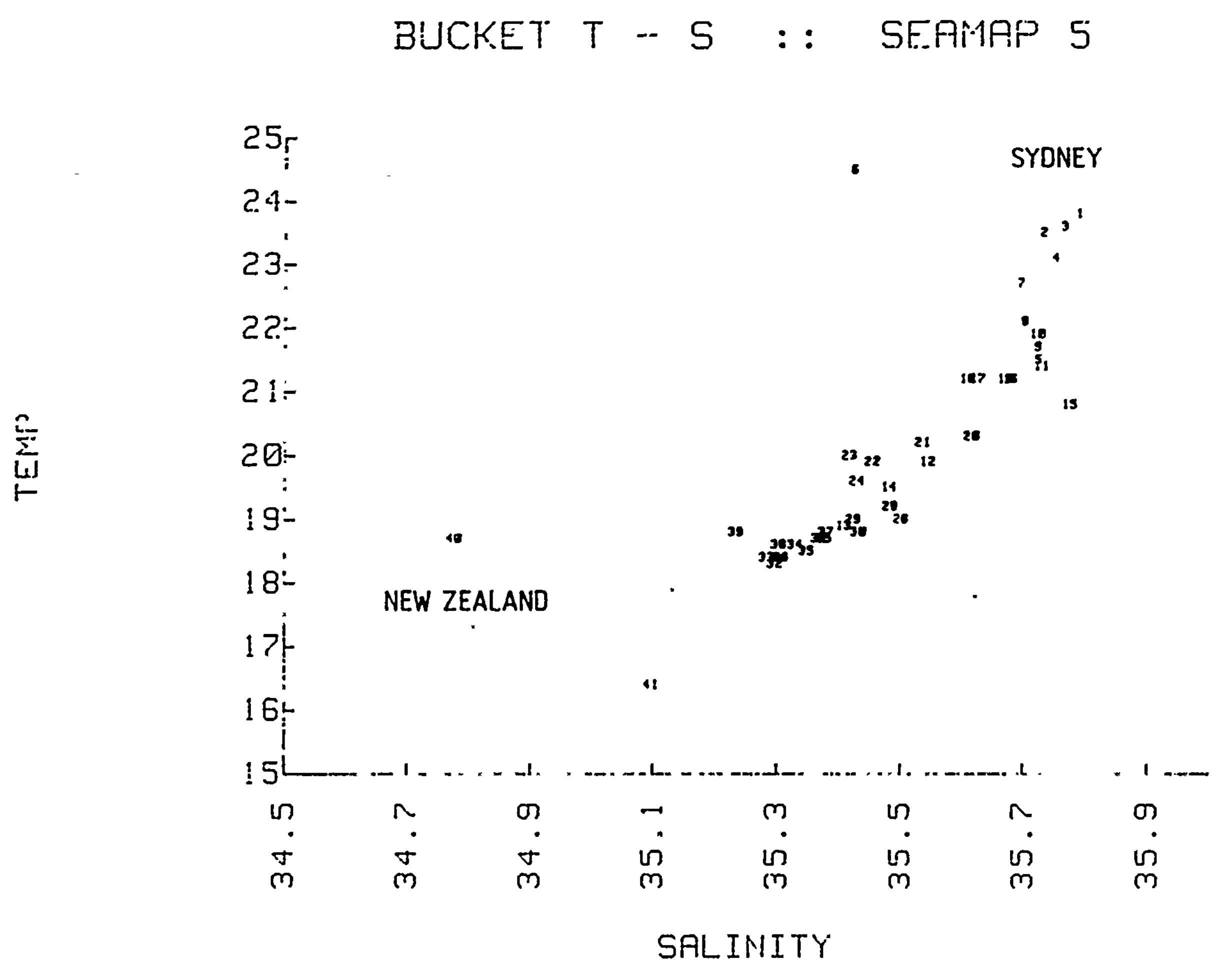


Figure 57. Temperature-salinity scatter diagram for surface samples for SEAMAP route B in summer 1987 on survey SEAMAP 5 (RANRL 18/87)

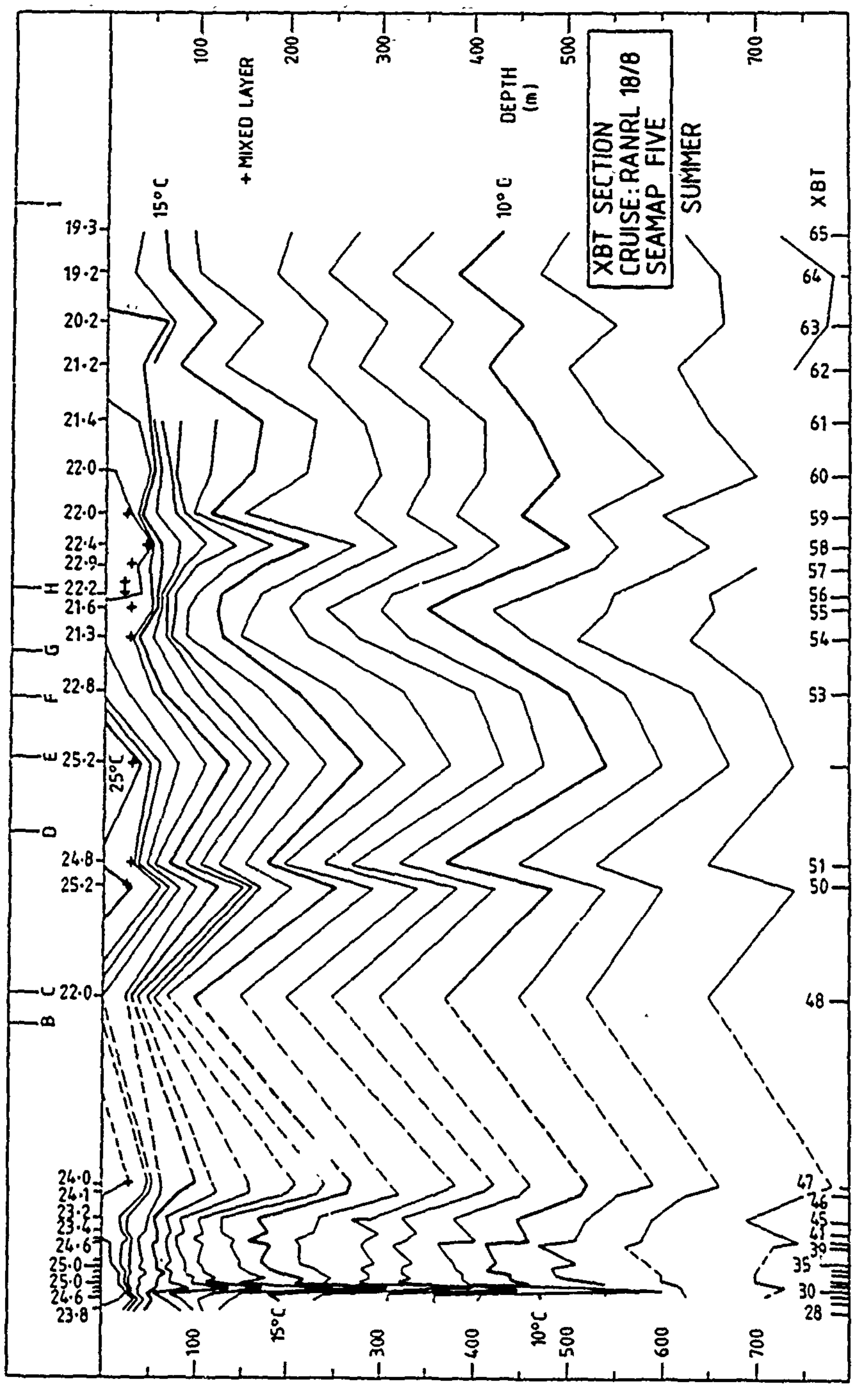


Figure 58. XBT temperature section from Sydney to waypoint I (38°20'S, 166°15'E) for 9 to 16 February 1987. Summer survey SEAMAP 5 (RANRL 18/87) route B. (+ show depth of surface mixed layer)

Seamap 5 - Route B - Summer

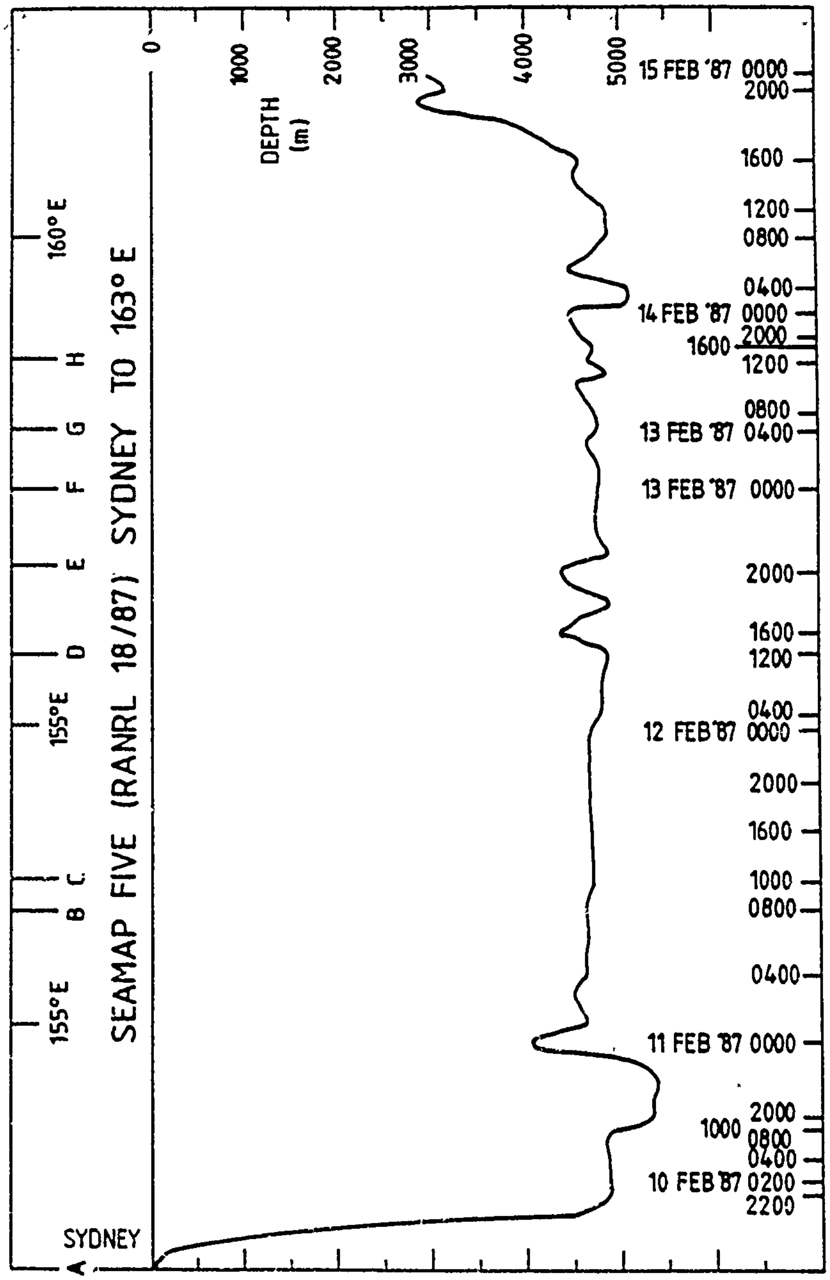


Figure 59. Bathymetry from Sydney to waypoint I (38°20'S, 166°15'E) for 9 to 16 February 1987. Summer survey SEAMAP 5 (RANRL 18/87) route B

Sea surface salinity

Sea surface salinity (figure 56) generally decreases with temperature, being highest on the northern (warmer) side of the Tasman Front in this area. This trend is shown quite well in a scatter plot of temperature and salinity samples collected by surface bucket (figure 57). Lowest salinities occur in association with the lower temperatures off the New Zealand coastline.

Bathymetry

Bathymetry is shown as sections along ship track in figures 59 and 61. Also see the VCTOD cross-sections (figures 62 and 63).

Temperature and salinity cross sections

XBT Temperature cross sections (figures 58 and 60).

The sections confirm that waypoint E lies in an eddy or meander of the EAC. A second eddy or meander lies after H which is about the same width as the meander crossed from C to D. A thermocline is seen at about 50 m after points A and H. Narrow eddy or meander structures are seen after point L and before the New Zealand coastline.

The meandering pattern seen in SST about waypoints I, J and K is likely related to the presence of the Lord Howe Rise, and the Challenger Plateau. Some evidence of bottom interaction can be seen in CTD station 14 in the form of a near well mixed bottom layer. Station 15 may show some similar evidence in the formation of a near bottom thermocline. These stations are on the Challenger Plateau (figures 49 and 61).

VCTOD Temperature and salinity sections

VCTOD temperature and salinity sections are shown in figures 62 and 63. Salinity data is not well calibrated, with only a single Nansen bottle strung on the wire above the VCTOD (but no conductivity shifts were seen on this cruise so that the data is expected to be self consistent). Stations are not closely spaced so that a smoothed picture is seen. The meanders in the XBT sections extend to the depth limits of the VCTOD data (2000 m) both in salinity and temperature.

Sonic layer depths ranged from 0 to 20 m from the East Australian Current area to station 8. The 20 m values were associated with warmer waters from the north. Sonic layer depths for stations 9 to 15 ranged from 30 to 50 m. The 50 m value occured in a broad warm meander at station 15. Sonic layers were almost always found in association with surface mixed layers as defined by isothermal waters seen in XBT traces.

The warm feature of station 14 shows the structure seen after point L in the XBT section to extend to the bottom (520 m), with contours parallel to the bottom between station 14

and 15. The Antarctic Intermediate Water salinity minimum lies at about 1000 m for the section. Salinity and temperature contours appear highly correlated to the section depth of 2000 m.

NANSEN station data listings and profiles

Nansen stations were not occupied on this cruise.

VCTOD station data listings and profiles

Fifteen VCTOD stations were occupied to 2000 m at the sites shown in figure 49. Listings and profiles are given on pages 132 to 139. Temperature and salinity cross-sections from these data have been discussed earlier.

T-S curves generally show a salinity maximum at or near the surface (after allowing for extreme salinity spiking at the base of the mixed layer), with salinity values decreasing to the salinity minimum of the AAIW at about 1000 m. The exceptions are station 7 and station 5 which have a shallow layer of low salinity surface water, (an effect masked to some degree by the 10 m averages), possibly carried out by the front from coastal areas. The monotonically decreasing S and T values are also occasionally interrupted by intrusions of Bass Strait water (higher salinity waters seen to 300 m and deeper) particularly in stations 5 and 7.

Currents

Components of surface geostrophic current perpendicular to station pairs relative to 1500 dbar (or the surface if this depth is not reached) are shown schematically in figure 64. The highest surface value is 37 cm/s (3/4 kn) to the south between stations 6 and 5. The current direction inferred from directions of SST isotherms between these two stations is to south-east, so the actual current strength relative to 1500 dbar is possibly about one knot. Current components become weak east of station 10 (5 cm/s to the north between stations 10 and 11), indicating that the main return flow of the Tasman Front is then north of the cruise track. Drifting buoy tracks (DRIBU data) are also shown. Depth of drogue and release dates are unknown.

Additional data

Tracks of vessels involved in the CSIRO merchant ship XBT programme are shown in figure 65. XBT are widely spaced.

Text continued on page 131

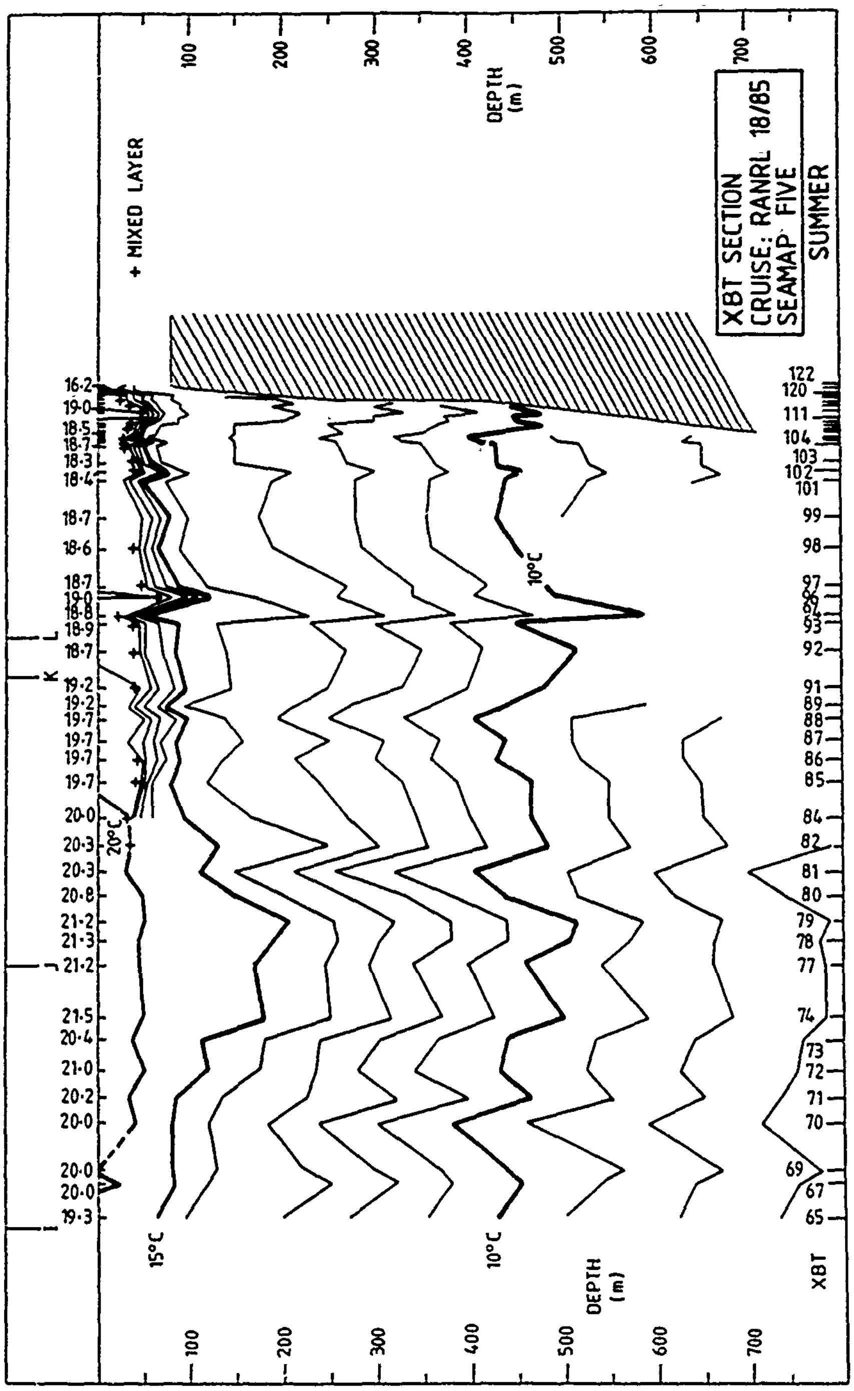


Figure 60. XBT temperature section from waypoint I (38°20'S, 166°15'E) to waypoint M (40°52'S, 172°02'E) south of Cape Farewell, New Zealand. For 16 to 19 February 1987. Summer survey SEAMAP 5 (RANRL 18/87) route B. (+ show depth of surface mixed layer)

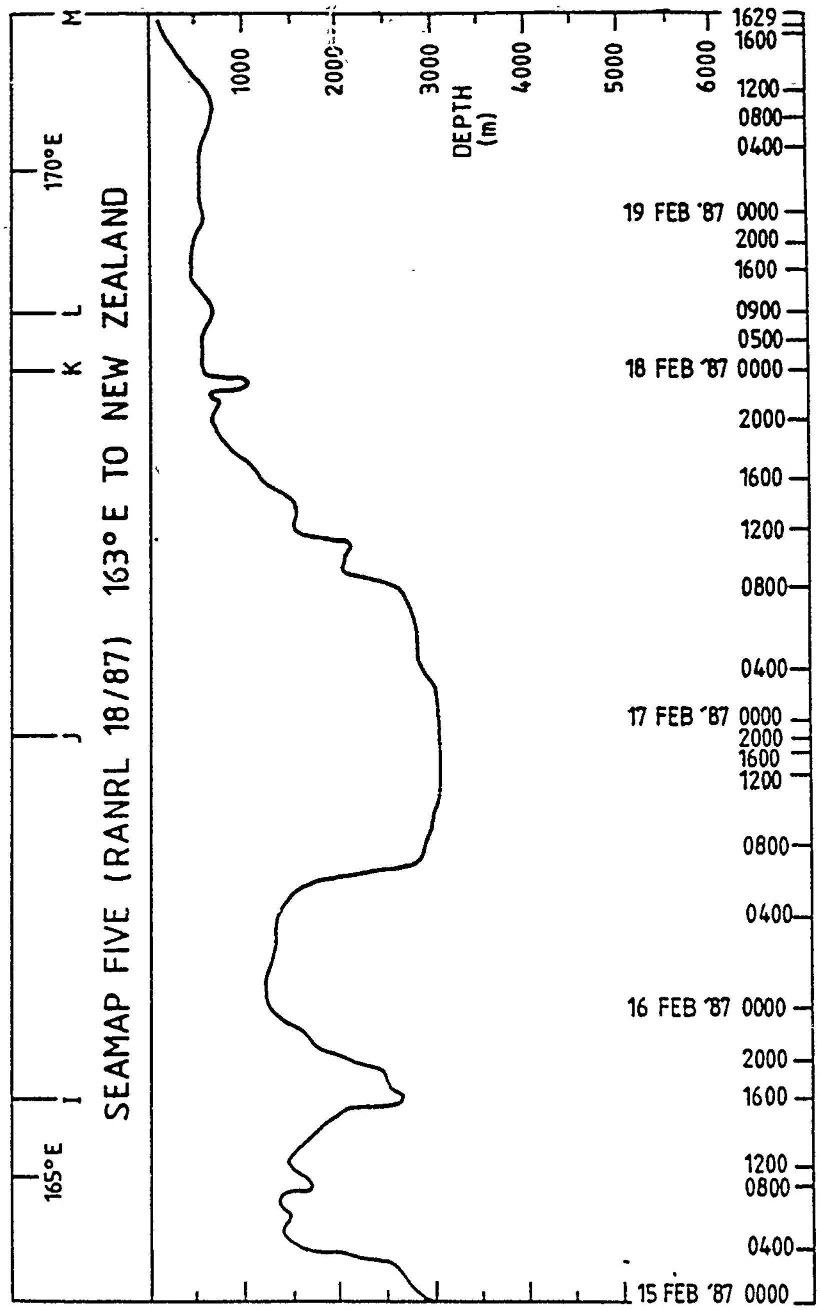


Figure 61. Bathymetry from waypoint I to waypoint M. For 16 to 19 February 1987. Summer survey SEAMAP 5 (RANRL 18/87) route B

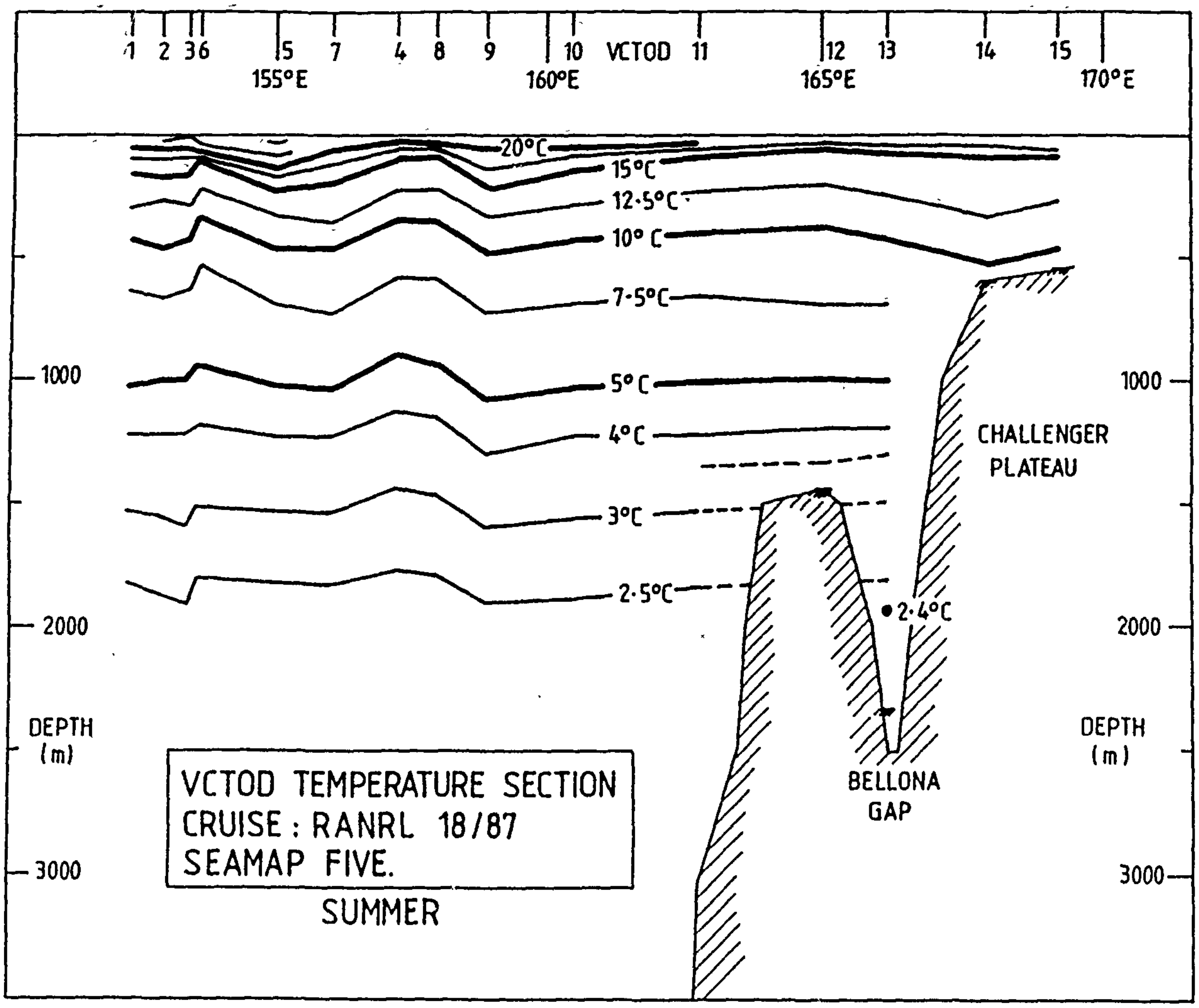


Figure 62. VCTOD temperature section from Sydney to south of Cape Farewell, New Zealand for 9 to 19 February 1987. Summer survey SEAMAP 5 (RANRL 18/87) route B

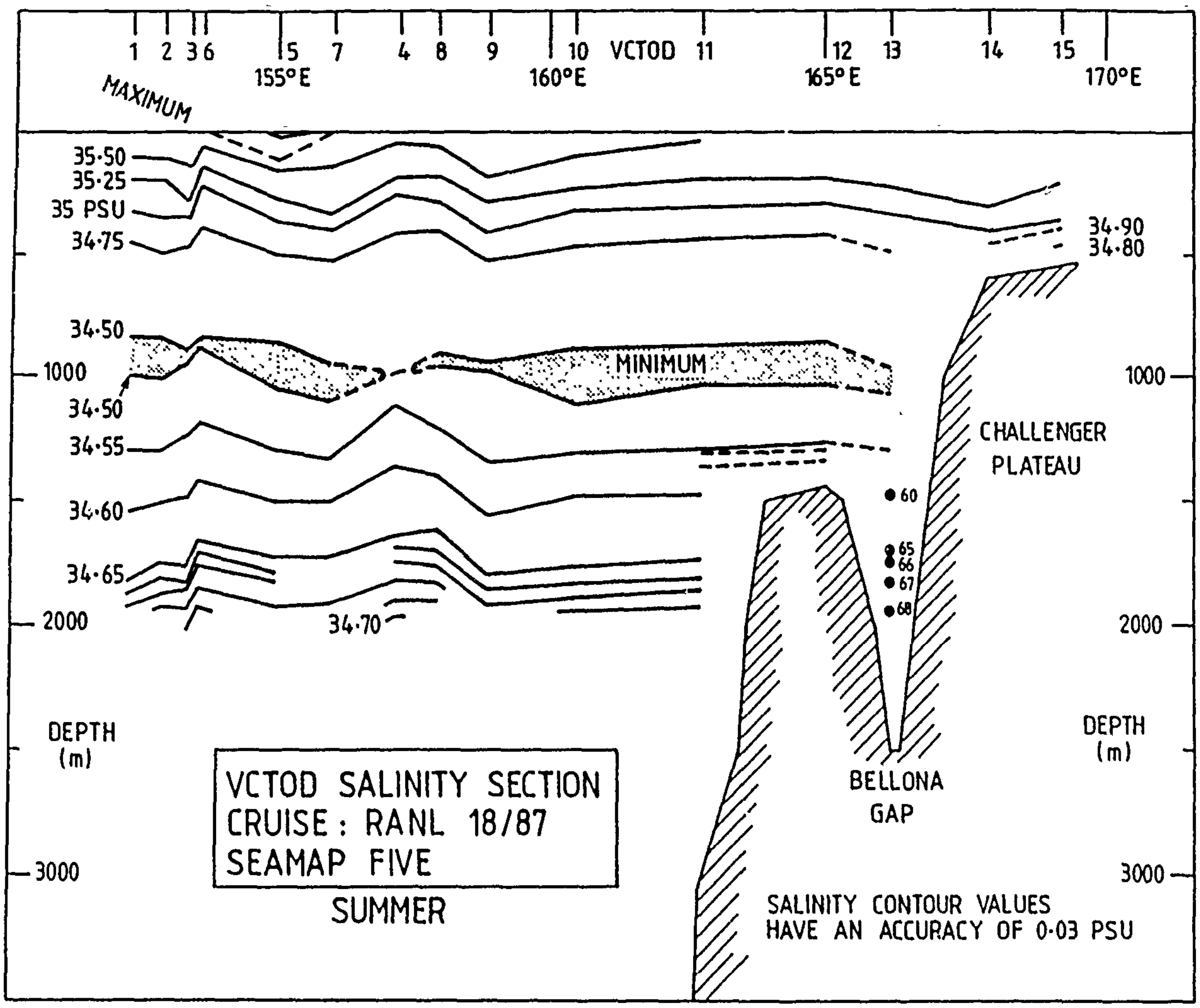


Figure 63. VCTOD salinity section from Sydney to south of Cape Farewell, New Zealand for 9 to 19 February 1987. Summer survey SEAMAP 5 (RANRL 18/87) route B. Subject to error because of a poor salinity calibration

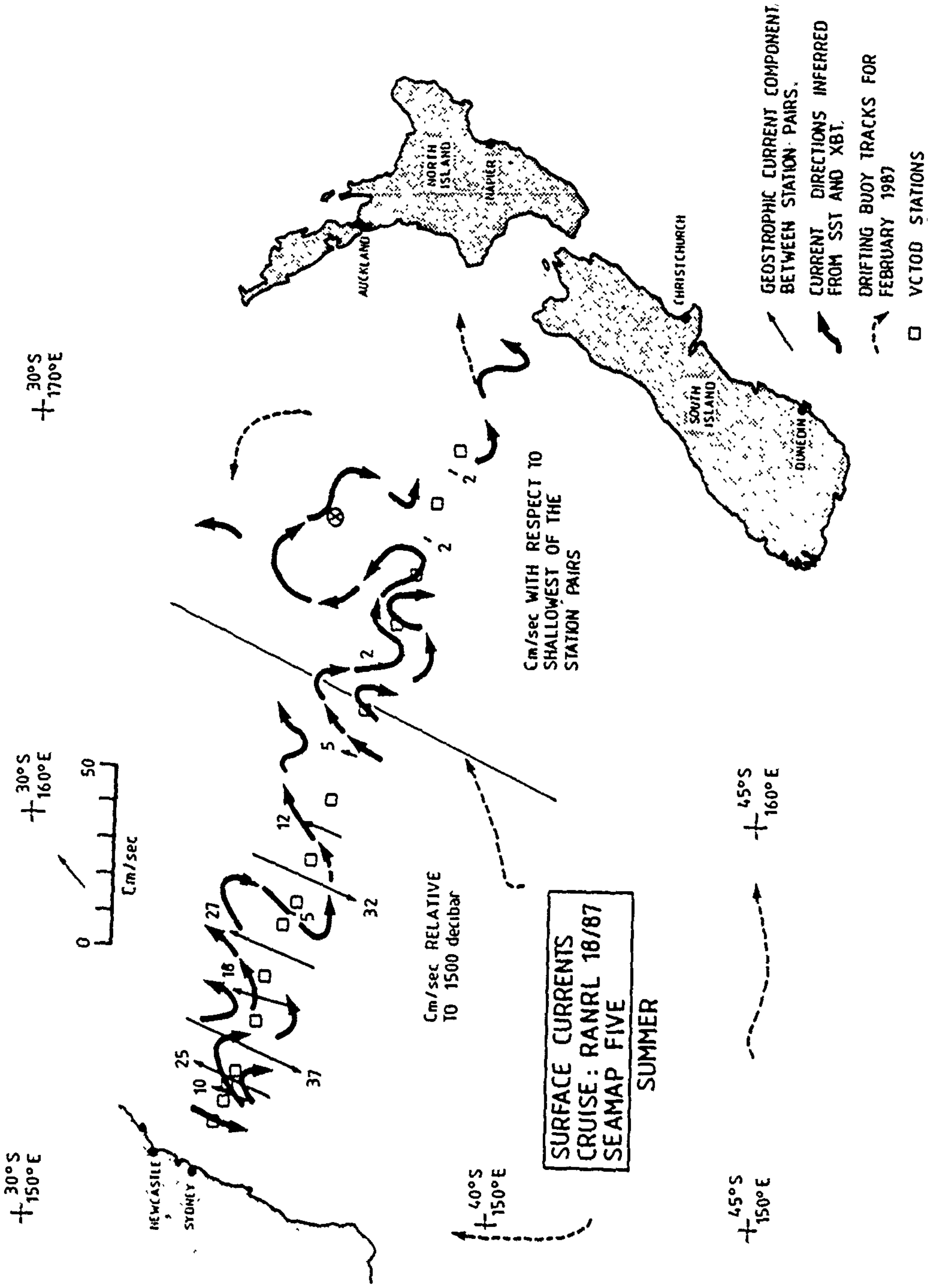


Figure 64. Surface current directions inferred from VCTOD, XBT and sea surface temperature data, 9 to 19 February 1987. Summer survey SEAMAP 5 (RANRL 18/87) route B. Geostrophic current values are subject to error because of a poor salinity calibration

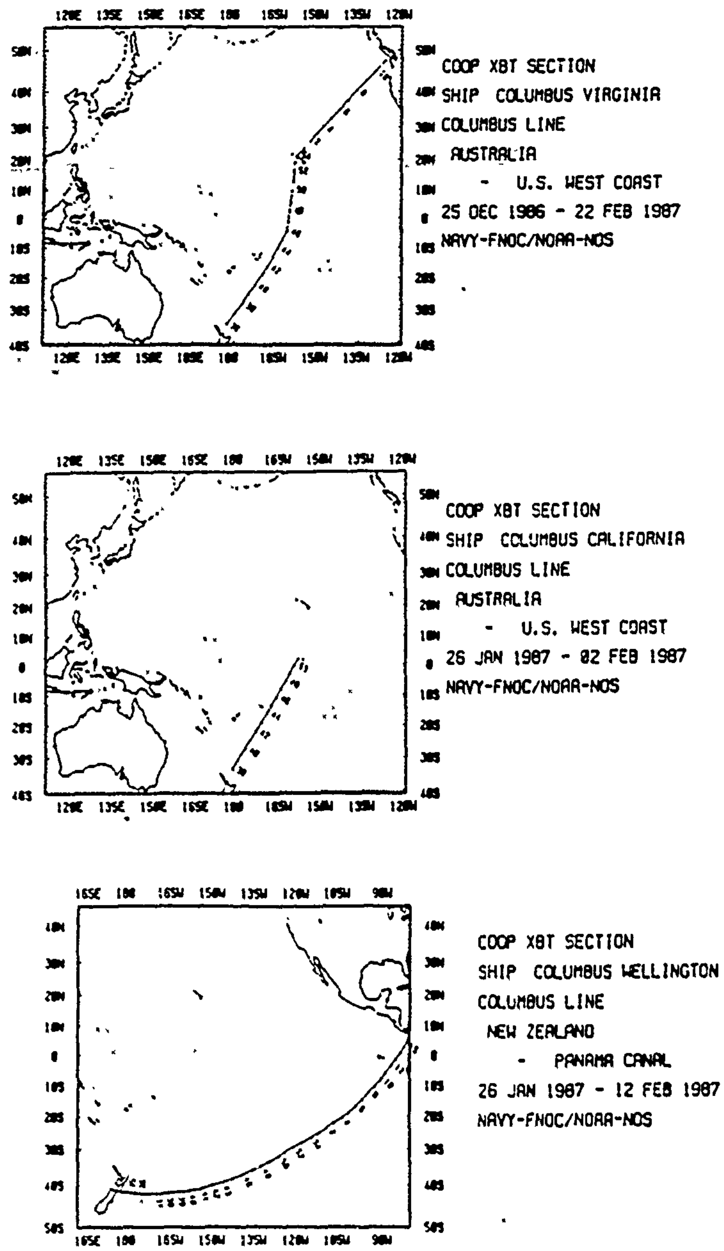


Figure 65(a). Tracks of vessels in the CSIRO merchant ship XBT programme in the south west Pacific Ocean for late January and February 1987. Coinciding with the period of summer survey SEAMAP 5 (RANRL 18/87) route B

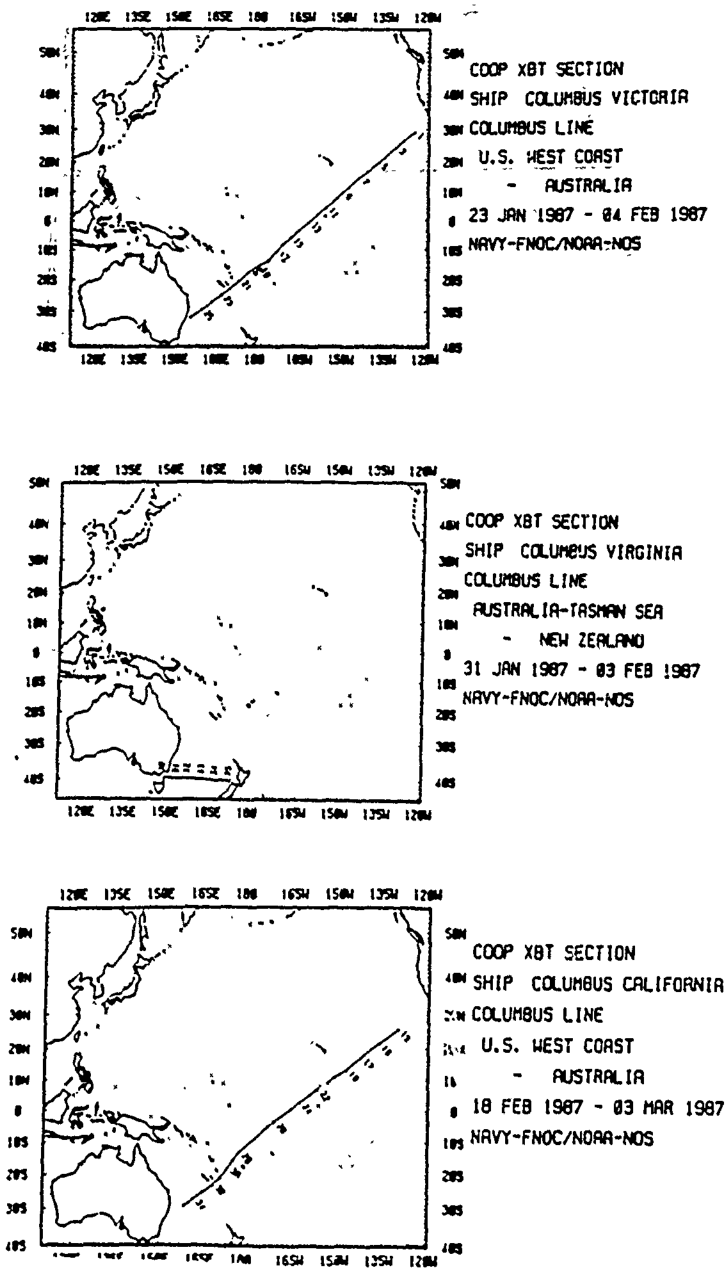


Figure 65(b). Tracks of vessels in the CSIRO merchant ship XBT programme in the south west Pacific Ocean for late January and February 1987. Coinciding with the period of summer survey SEAMAP 5 (RANRL 18/87) route B

TABLES OF VCTOD DATA FOR 15 STATIONS OCCUPIED ON SUMMER SURVEY SEAMAP 5 (RANRL 18/87) ARE GIVEN ON FOLLOWING PAGES.

DATA ARE FOR DOWNCASTS. SPURIOUS SPIKES OCCUR IN SALINITY AND TEMPERATURE - SALINITY PROFILES, ESPECIALLY NEAR THE SURFACE.

SEE FIGURE 49 (PAGE 110) FOR A CHART OF STATION POSITIONS.

FOR THIS SURVEY A ROSETTE SAMPLER WAS NOT AVAILABLE, AND ONLY A SINGLE NANSEN BOTTLE SAMPLE WAS TAKEN, THE NANSEN BOTTLE BEING STRUNG ON THE WIRE 2 TO 3 m ABOVE THE CTD. SALINITY IS THEREFORE NOT WELL CALIBRATED.

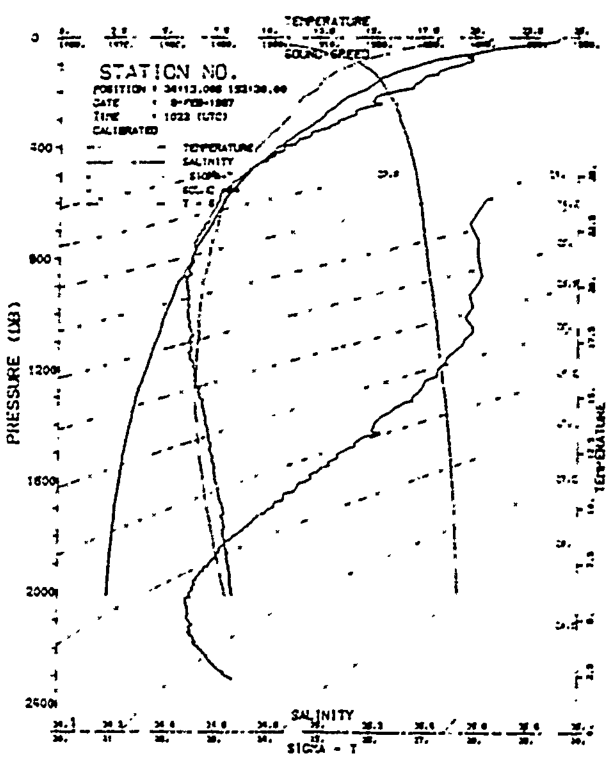
Text continued on page 140

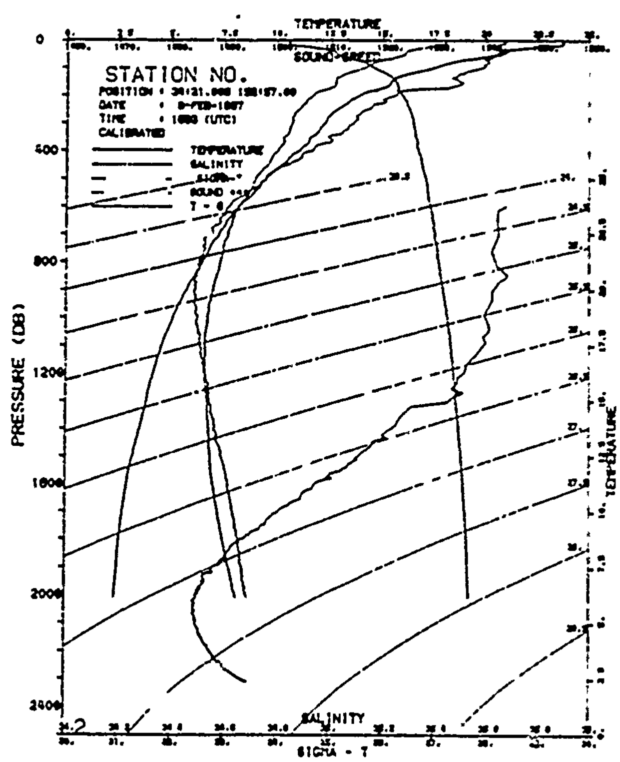
SHIP : HMAS COOK - Plessey
STATION NUMBER : 1 (THROUGH THE CRUISE)
STATION NUMBER : 1 (THROUGH THE YEAR)
DATE : 09-FEB-1987 (DAY NUMBER 40)
START TIME : 1022 GMT + 0
CRUISE : C01/87
POSITION : 34:13.00S 152:30.00E
CAST DEPTH : METRES
BOTTOM DEPTH : 4819 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	S.A	G.A.	Sound	Pot.Temp			
0.0	0.0	24.026	35.659	24.138	376.92	0.000	1532.83	24.08	18	0.003	0.002
10.0	9.9	24.005	35.666	24.146	376.55	0.377	1532.83	24.00	54	0.014	0.019
20.0	19.9	23.632	35.623	24.223	369.54	0.750	1531.93	23.63	51	0.246	0.274
30.0	29.8	22.453	35.600	24.553	338.45	1.104	1529.08	22.45	48	0.338	0.337
40.0	39.7	21.333	35.604	24.884	309.22	1.428	1526.22	21.33	50	0.254	0.247
50.0	49.6	20.561	35.629	25.091	287.73	1.726	1524.39	20.55	50	0.170	0.105
60.0	59 [illegible]	[illegible].926	35.595	25.237	274.33	2.087	1522.75	19.91	45	0.220	0.265
70.0	69 [illegible]	[illegible].056	35.595	25.463	253.17	2.271	1520.47	19.04	52	0.230	0.259
80.0	79 [illegible]	[illegible].271	35.579	25.649	235.70	2.515	1518.43	18.26	53	0.267	0.141
90.0	89.[illegible]	[illegible]7.864	35.575	25.762	225.29	2.746	1517.25	17.79	50	0.133	0.154
100.0	99.3	17.374	35.557	25.953	216.92	2.967	1516.14	17.36	55	0.180	0.180
120.0	119.1	16.449	35.477	26.011	202.39	3.388	1513.63	16.43	61	0.115	0.129
140.0	139.0	15.791	35.421	26.120	192.54	3.781	1511.51	15.77	52	0.124	0.140
160.0	158.8	15.316	35.390	26.204	185.11	4.157	1510.77	15.29	42	0.057	0.067
180.0	178.6	14.903	35.265	26.276	178.75	4.522	1509.08	14.88	46	0.032	0.032
200.0	198.5	14.412	35.277	26.314	175.54	4.877	1508.39	14.38	30	0.092	0.108
220.0	218.3	13.707	35.210	26.401	167.64	5.220	1506.60	13.76	27	0.068	0.060
240.0	238.1	13.425	35.239	26.492	159.45	5.549	1505.91	13.39	154	0.025	0.027
260.0	258.0	13.138	35.161	26.491	160.00	5.869	1505.14	13.10	33	0.078	0.084
280.0	277.8	12.808	35.137	26.538	155.90	6.184	1504.39	12.77	32	0.022	0.025
300.0	297.6	12.493	35.080	26.557	154.48	6.494	1503.56	12.45	28	0.075	0.084
320.0	317.5	12.114	35.047	26.605	150.23	6.798	1502.58	12.07	34	0.076	0.083
340.0	337.3	11.689	34.991	26.642	146.97	7.094	1501.39	11.65	36	0.075	0.080
360.0	357.1	11.297	34.962	26.692	142.39	7.383	1500.35	11.25	33	0.039	0.045
380.0	376.9	10.890	34.905	26.722	139.75	7.665	1499.14	10.84	32	0.066	0.058
400.0	396.8	10.501	34.865	26.760	136.36	7.942	1498.09	10.45	36	0.056	0.043
420.0	416.6	10.213	34.831	26.784	134.28	8.212	1497.35	10.16	36	0.067	0.064
440.0	436.4	9.928	34.809	26.815	131.52	8.477	1496.66	9.88	39	0.043	0.041
460.0	456.2	9.590	34.771	26.843	129.06	8.738	1495.70	9.54	33	0.044	0.047
480.0	476.0	9.273	34.737	26.869	126.70	8.994	1494.84	9.22	36	0.031	0.027
500.0	495.8	9.016	34.714	26.892	124.68	9.246	1494.23	8.96	39	0.027	0.029
550.0	545.3	8.408	34.643	26.932	121.17	9.861	1492.67	8.35	31	0.031	0.028
600.0	594.8	7.948	34.610	26.976	117.34	10.455	1491.76	7.89	35	0.027	0.028
700.0	693.8	7.151	34.549	27.043	111.58	11.596	1490.27	7.08	34	0.042	0.042
800.0	792.7	6.379	34.516	27.122	104.38	12.673	1488.86	6.30	36	0.012	0.009
900.0	891.6	5.635	34.497	27.201	96.86	13.685	1487.50	5.56	37	0.016	0.014
1000.0	990.5	5.130	34.498	27.262	91.23	14.625	1487.12	5.05	32	0.018	0.019
1100.0	1089.2	4.638	34.503	27.323	85.48	15.505	1486.73	4.55	27	0.029	0.019
1200.0	1188.0	4.167	34.527	27.393	78.63	16.329	1486.52	4.07	28	0.010	0.006
1300.0	1286.7	3.705	34.543	27.453	72.58	17.087	1486.24	3.61	33	0.012	0.006
1400.0	1385.3	3.408	34.566	27.500	67.96	17.786	1486.66	3.30	32	0.020	0.013
1500.0	1483.9	3.123	34.590	27.546	63.43	18.441	1487.15	3.01	34	0.010	0.007
1600.0	1582.5	2.916	34.607	27.579	60.[illegible]	19.058	1487.95	2.80	32	0.003	0.004
1700.0	1681.0	2.705	34.638	27.622	56.06	19.638	1488.74	2.58	36	0.000	0.002
1800.0	1779.5	2.579	34.640	27.636	54.86	20.193	1489.89	2.45	30	0.005	0.004
1900.0	1877.9	2.446	34.660	27.662	52.33	20.729	1491.04	2.31	41	0.006	0.005
2000.0	1976.2	2.352	34.674	27.682	50.62	21.243	1492.31	2.21	33	0.003	0.004
2010.0	1986.1	2.343	34.676	27.684	50.43	21.294	1492.45	2.20	84	0.004	0.002

SHIP : HMAS COOK - Plessey
STATION NUMBER : 2 (THROUGH THE CRUISE)
STATION NUMBER : 2 (THROUGH THE YEAR)
DATE : 09-FEB-1987 (DAY NUMBER 40)
START TIME : 1533 GMT + 0
CRUISE : C01/87
POSITION : 34:21.00S 152:57.00E
CAST DEPTH : METRES
BOTTOM DEPTH : 4844 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	S.A	G.A.	Sound	Pot.Temp			
0.0	0.0	23.721	35.675	24.236	367.51	0.000	1532.20	23.72	1	0.000	0.000
10.0	9.9	23.720	35.676	24.236	367.90	0.368	1532.22	23.72	47	0.003	0.008
20.0	19.9	23.306	35.645	24.365	356.02	0.730	1530.79	23.22	53	0.474	0.501
30.0	29.8	21.728	35.625	24.770	317.74	1.067	1527.11	21.72	59	0.349	0.369
40.0	39.7	20.799	35.675	25.064	290.13	1.370	1524.92	20.79	63	0.190	0.180
50.0	49.6	20.493	35.671	25.143	282.93	1.657	1524.35	20.48	59	0.035	0.047
60.0	59.6	20.016	35.627	25.237	274.17	1.936	1523.08	20.01	57	0.260	0.276
70.0	69.5	19.114	35.603	25.454	254.02	2.200	1520.68	19.10	62	0.365	0.394
80.0	79.4	18.341	35.609	25.655	235.18	2.444	1518.76	18.33	55	0.169	0.160
90.0	89.3	17.884	35.597	25.759	225.56	2.675	1517.58	17.87	60	0.123	0.130
100.0	99.3	17.512	35.580	25.843	217.87	2.897	1516.66	17.50	80	0.123	0.130
120.0	119.1	16.342	35.518	26.068	196.97	3.312	1513.65	16.32	73	0.136	0.138
140.0	138.9	15.518	35.477	26.226	182.49	3.691	1511.28	15.50	71	0.095	0.110
160.0	158.8	15.333	35.510	26.292	176.74	4.050	1511.12	15.31	46	0.062	0.072
180.0	178.6	14.666	35.327	26.298	176.55	4.403	1509.02	14.64	43	0.273	0.352
200.0	198.5	13.927	35.252	26.398	167.44	4.746	1506.97	13.90	45	0.064	0.065
220.0	218.3	13.431	35.209	26.468	161.22	5.076	1505.68	13.40	56	0.045	0.036
240.0	238.1	13.077	35.165	26.506	157.99	5.396	1504.77	13.04	50	0.053	0.054
260.0	258.0	12.673	35.128	26.552	153.99	5.707	1503.73	12.64	46	0.057	0.062
280.0	277.8	12.401	35.102	26.591	150.65	6.012	1503.15	12.36	51	0.032	0.027
300.0	297.6	12.279	35.092	26.608	149.55	6.312	1503.05	12.24	52	0.024	0.025
320.0	317.5	12.054	35.068	26.632	147.50	6.609	1502.60	12.01	48	0.027	0.026
340.0	337.3	11.881	35.044	26.647	146.57	6.904	1502.30	11.84	46	0.023	0.026
360.0	357.1	11.539	35.005	26.681	143.63	7.195	1501.42	11.49	46	0.000	0.008
380.0	376.9	11.373	34.963	26.679	144.21	7.483	1501.10	11.32	44	0.053	0.059
400.0	396.8	11.075	34.944	26.719	140.60	7.769	1500.38	11.03	44	0.026	0.031
420.0	416.6	10.688	34.897	26.752	137.70	8.048	1499.29	10.64	27	0.032	0.028
440.0	436.4	10.470	34.871	26.769	136.39	8.321	1498.81	10.42	28	0.048	0.055
460.0	456.2	10.138	34.819	26.788	134.72	8.592	1497.88	10.08	26	0.069	0.071
480.0	476.0	9.799	34.783	26.817	132.08	8.859	1496.93	9.74	28	0.054	0.052
500.0	495.8	9.481	34.762	26.854	128.69	9.120	1496.13	9.42	31	0.031	0.029
550.0	545.3	8.936	34.698	26.893	125.46	9.756	1494.86	8.88	21	0.026	0.032
600.0	594.8	8.236	34.620	26.940	121.05	10.375	1492.99	8.17	21	0.038	0.025
700.0	693.8	7.286	34.563	27.035	112.52	11.539	1490.98	7.22	21	0.011	0.005
800.0	792.7	6.496	34.512	27.103	106.39	12.637	1489.46	6.42	23	0.024	0.013
900.0	891.6	5.760	34.492	27.181	98.96	13.664	1488.12	5.68	24	0.024	0.024
1000.0	990.5	5.101	34.504	27.270	90.41	14.609	1487.12	5.02	30	0.008	0.007
1100.0	1089.2	4.570	34.513	27.338	83.85	15.481	1486.62	4.48	28	0.009	0.008
1200.0	1188.0	4.174	34.529	27.393	78.64	16.292	1486.65	4.08	25	0.012	0.010
1300.0	1286.7	3.867	34.549	27.441	74.16	17.051	1487.03	3.77	29	0.002	0.001
1400.0	1385.3	3.544	34.566	27.487	69.65	17.768	1487.35	3.45	31	0.010	0.011
1500.0	1483.9	3.213	34.593	27.541	64.29	18.435	1487.64	3.10	27	0.012	0.005
1600.0	1582.5	2.942	34.618	27.585	59.82	19.052	1488.19	2.83	32	0.007	0.003
1700.0	1681.0	2.752	34.640	27.620	56.47	19.634	1489.07	2.63	32	0.006	0.006
1800.0	1779.4	2.504	34.659	27.650	53.54	20.184	1490.04	2.46	27	0.004	0.004
1900.0	1877.9	2.404	34.676	27.673	51.57	20.711	1491.31	2.35	27	0.003	0.001
2000.0	1976.2	2.377	34.691	27.694	49.66	21.220	1492.53	2.24	53	0.005	0.003
2010.0	1986.1	2.371	34.692	27.695	49.57	21.270	1492.65	2.23	39	0.000	0.003



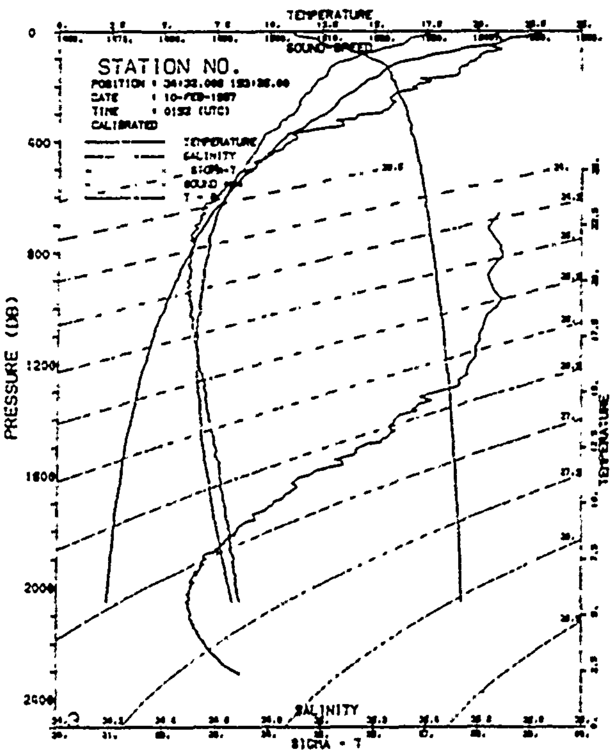


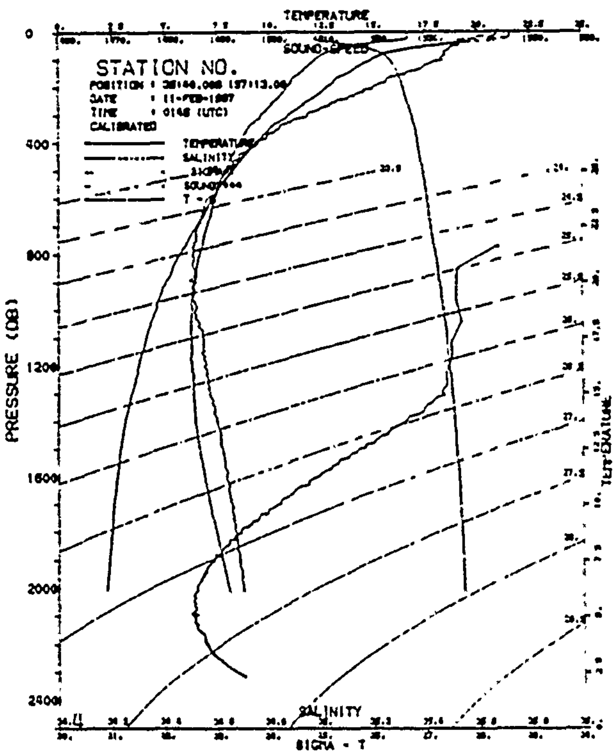
SHIP : HMAS COOK - Plessey
STATION NUMBER : 3 (THROUGH THE CRUISE)
STATION NUMBER : 3 (THROUGH THE YEAR)
DATE : 10-FEB-1987 (DAY NUMBER 41)
START TIME : 0152 GMT - Z
CRUISE : CU18/87
POSITION : 34:32.00S 153:26.00E
CAST DEPTH : METRES
BOTTOM DEPTH : 4846 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	22.962	35.677	24.460	346.61	0.346	1530.27	22.96	76	0.013	0.013
20.0	19.9	22.075	35.658	24.699	324.20	0.682	1527.92	22.07	65	0.517	0.528
30.0	29.8	21.424	35.685	24.900	305.35	0.997	1526.57	21.42	78	0.071	0.078
40.0	39.7	21.139	35.691	24.984	297.79	1.298	1525.92	21.13	61	0.102	0.107
50.0	49.6	20.726	35.659	25.072	289.74	1.592	1524.98	20.72	56	0.236	0.273
60.0	59.6	19.584	35.666	25.380	260.69	1.867	1521.98	19.57	58	0.245	0.233
70.0	69.5	18.939	35.678	25.556	244.24	2.120	1520.33	18.93	72	0.187	0.204
80.0	79.4	18.235	35.625	25.694	231.48	2.357	1518.42	18.22	56	0.341	0.367
90.0	89.3	17.587	35.606	25.839	217.95	2.582	1516.71	17.57	47	0.154	0.162
100.0	99.3	17.145	35.596	25.938	208.70	2.796	1515.54	17.13	80	0.156	0.165
120.0	119.1	15.967	35.558	26.186	185.76	3.187	1512.33	15.95	68	0.100	0.105
140.0	138.9	15.484	35.528	26.272	178.08	3.549	1511.21	15.46	47	0.045	0.044
160.0	158.8	15.222	35.513	26.319	174.17	3.901	1510.68	15.20	27	0.037	0.046
180.0	178.6	14.604	35.415	26.379	168.86	4.248	1508.94	14.58	26	0.022	0.004
200.0	198.5	14.283	35.356	26.403	167.12	4.585	1508.18	14.25	23	0.053	0.068
220.0	218.3	13.978	35.309	26.432	164.82	4.915	1507.44	13.95	23	0.067	0.087
240.0	238.1	13.486	35.261	26.497	159.03	5.239	1506.13	13.45	24	0.061	0.047
260.0	258.0	13.255	35.277	26.556	153.82	5.551	1505.77	13.22	28	0.026	0.034
280.0	277.8	12.984	35.252	26.592	150.83	5.856	1505.15	12.95	28	0.036	0.035
300.0	297.6	12.638	35.:74	26.600	150.42	6.156	1504.15	12.60	35	0.126	0.175
320.0	317.5	12.120	35.090	26.636	147.24	6.452	1502.66	12.08	35	0.100	0.144
340.0	337.3	11.757	35.086	26.703	141.21	6.739	1501.84	11.71	35	0.010	0.015
360.0	357.1	11.277	34.948	26.685	143.07	7.024	1500.27	11.23	31	0.080	0.076
380.0	376.9	10.797	34.904	26.737	138.25	7.307	1498.91	10.75	36	0.037	0.032
400.0	396.7	10.563	34.883	26.773	135.08	7.580	1498.23	10.46	47	0.031	0.032
420.0	416.6	10.256	34.855	26.795	133.31	7.849	1497.63	10.21	39	0.034	0.032
440.0	436.4	9.990	34.815	26.809	132.13	8.114	1496.95	9.94	38	0.064	0.063
460.0	456.2	9.711	34.791	26.838	129.63	8.376	1496.27	9.66	31	0 037	0.037
480.0	476.0	9.369	34.746	26.859	127.68	8.634	1495.26	9.32	29	0.036	0.023
500.0	495.8	9.186	34.726	26.874	126.53	8.888	1494.92	9.13	28	0.054	0.058
550.0	545.3	8.465	34.649	26.928	121.60	9.506	1492.98	8.41	24	0.041	0.032
600.0	594.8	7.905	34.601	26.975	117.38	10.103	1491.64	7.84	21	0.039	0.034
700.0	693.8	6.938	34.526	27.054	110.21	11.242	1489.46	6.87	19	0.026	0.030
800.0	792.7	6.214	34.511	27.139	102.52	12.304	1488.27	6.14	18	0.017	0.016
900.0	891.6	5.582	34.493	27.204	96.44	13.297	1487.33	5.50	31	0.037	0.028
1000 0	990.4	5.042	34.509	27.281	89.28	14.226	1486.83	4.96	32	0.009	0.006
1100.0	1089.2	4.534	34.520	27.347	82.93	15.084	1486.41	4.45	36	0.014	0.012
1200.0	1188.0	4.141	34.532	27.400	77.95	15.887	1486.43	4.05	37	0.016	0.009
1300.0	1286.6	3.749	34.560	27.462	71.88	16.632	1486.50	3.65	28	0.009	0.005
1400.0	1385.3	3.494	34.574	27.498	68.47	17.336	1487.07	3.39	37	0.007	0.006
1500.0	1483.9	3.200	34.601	27.548	63.57	17.995	1487.55	3.09	32	0.001	0.001
1600.0	1582.4	3.012	34.613	27.575	60.99	18.615	1488.41	2.90	33	0.006	0.004
1700.0	1680.9	2.788	34.636	27.613	57.22	19.207	1489.18	2.67	28	0.004	0.002
1800.0	1779.4	2.629	34.656	27.643	54.37	19.767	1490.19	2.50	26	0.005	0.003
1900.0	1877.8	2.512	34.671	27.666	52.34	20.303	1491.33	2.38	24	0.000	0.000
2000 0	1976.2	2.421	34 682	27.683	50.88	20.820	1492.65	2.28	31	0.001	0.000
2050.0	2025.4	2.359	34.694	27.697	49.52	21.071	1493.25	2.21	198	0.004	0.004

SHIP : HMAS COOK - Plessey
STATION NUMBER : 4 (THROUGH THE CRUISE)
STATION NUMBER : 4 (THROUGH THE YEAR)
DATE : 11-FEB-1987 (DAY NUMBER 42)
START TIME : 0145 GMT - Z
CRUISE : CU18/87
POSITION : 35:40.00S 157:13.00E
CAST DEPTH : METRES
BOTTOM DEPTH : 4671 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
0.0	0.0	21.557	35.667	24.850	309.04	0.000	1526.60	21.56	7	0 000	0 008
10.0	9.9	21.558	35.678	24.858	308.67	0.309	1526.70	21.56	49	0.007	0.010
20.0	19.9	21.496	35.655	24.858	309.02	0.618	1526.64	21.49	56	0.097	0.118
30.0	29.8	20.487	35.527	25.035	292.51	0.918	1523.73	20.48	47	0.431	0.459
40.0	39.7	19.014	35.519	25.416	256.58	1.193	1519.79	19.01	48	0.303	0.281
50.0	49.6	17.918	35.522	25.695	230.34	1.436	1516.81	17.90	56	0.410	0.439
60.0	59.6	16.715	35.501	25.967	204.71	1.654	1513.49	16.71	62	0.251	0.256
70.0	69.5	16.041	35.481	26.109	191.46	1.852	1511.64	16.03	51	0.195	0.199
80.0	79.4	15.532	35.481	26.225	180.72	2.038	1510.31	15.52	66	0.116	0.113
90.0	89.3	15.230	35.472	26.286	175.21	2.216	1509.55	15.22	49	0.094	0.101
100.0	99.2	14.971	35.466	26.338	170.52	2.389	1508.92	14.96	43	0.058	0 052
120.0	119.1	14.497	35.417	26.404	164.81	2.725	1507.73	14.48	52	0.041	0.045
140.0	138.9	14.048	35.359	26.456	160.35	3.050	1506.59	14.03	42	0.054	0.060
160.0	158.8	13.503	35.284	26.511	155.53	3.366	1505.08	13.48	51	0.100	0.106
180.0	178.6	13.169	35.250	26.553	151.97	3.673	1504.31	13.14	35	0.014	0.025
200.0	198.4	12.819	35.206	26.589	148.98	3.975	1503.42	12.79	39	0.042	0.037
220.0	218.3	12.520	35.160	26.613	147.16	4.272	1502.68	12.49	32	0.045	0.056
240.0	238.1	12.136	35.104	26.644	144.55	4.564	1501.66	12.10	28	0.044	0.041
260.0	257.9	11.712	35.044	26.678	141.61	4.850	1500.46	11.68	28	0.048	0.041
280.0	277.8	11.35?	34.996	26.708	139.10	5.131	1499.51	11.32	31	0.060	0.061
300.0	297.6	10.945	34.953	26.750	135.40	5.406	1498.38	10.91	32	0.037	0.032
320.0	317.4	10.561	34.895	26.773	133.42	5.676	1497.30	10.52	32	0.051	0.051
340.0	337.2	10.15?	34.844	26.803	130.74	5.941	1496.14	10.12	28	0.052	0.047
360.0	357.1	9.911	34.820	26.827	128.78	6.200	1495.60	9.87	27	0.031	0.036
380.0	376.9	9.650	34.796	26.853	126.55	6.456	1494.95	9.61	25	0.016	0.013
400.0	396.7	9.399	34.760	26.865	125.56	6.709	1494.29	9.35	28	0.031	0.031
420.0	416.5	9.148	34.726	26.880	124.36	6.959	1493.66	9.10	24	0.040	0.040
440.0	436.3	8.909	34.693	26.892	123.37	7.207	1493.07	8.86	26	0.050	0 048
460.0	456.1	8.701	34.682	26.917	121.21	7.451	1492.65	8.65	31	0.034	0.039
480.0	476.0	8.453	34.666	26.943	118.88	7.691	1492.03	8.40	30	0.015	0.016
500.0	495.8	8.225	34.648	26.963	117.13	7.928	1491.51	8.17	30	0.025	0.021
550.0	545.3	7.700	34.589	26.996	114.34	8.508	1490.27	7.64	30	0.039	0.027
600.0	594.8	7.299	34.565	27.035	111.03	9.069	1489.53	7.24	28	0.033	0.035
700.0	693.7	6.508	34.530	27.115	103.84	10.143	1488.07	6.44	38	0.021	0.020
800.0	792.6	5.723	34.510	27.201	95.85	11.143	1486.57	5.65	46	0.027	0.026
900 0	891.5	5.058	34.517	27.286	87.79	12.063	1485.54	4.98	26	0.006	0.009
1000.0	990.3	4.584	34.517	27.340	82.75	12.914	1485.25	4.50	21	0.012	0.014
1100.0	1089.1	4.133	34.549	27.414	75.70	13.704	1485.05	4.05	53	0.010	0.009
1200.0	1187.8	3.785	34.554	27.453	71.95	14.441	1485.24	3.69	15	0.016	0.015
1300.0	1286.5	3.449	34.574	27.502	67.19	15.137	1485.47	3.35	24	0.014	0.014
1400.0	1385.2	3.147	34.601	27.553	62.20	15.782	1485.89	3.05	29	0.009	0.005
1500.0	1483.7	2.927	34.622	27.590	58.66	16.385	1486.67	2.82	29	0 002	0.003
1600.0	1582.3	2.747	34.638	27.619	55.94	16.956	1487.56	2.63	28	0.012	0.007
1700.0	1680.8	2.604	34.?50	27.649	53.1?	17.502	1488.64	2.48	21	0.002	0.000
1800.0	1779.2	2.484	34.674	27.671	51.?5	18.025	1489.82	2.36	35	0.004	0.004
1900.0	1877.6	2.376	34.689	27.692	49.34	18.528	1491.03	2.24	37	0.005	0.005
2000.0	1976.0	2.276	34.702	27.711	47.59	19.013	1492.31	2.14	127	0.005	0.001
2010.0	1985.8	2.270	34.704	27.713	47.42	19.061	1492.39	2.13	98	0.000	0.000



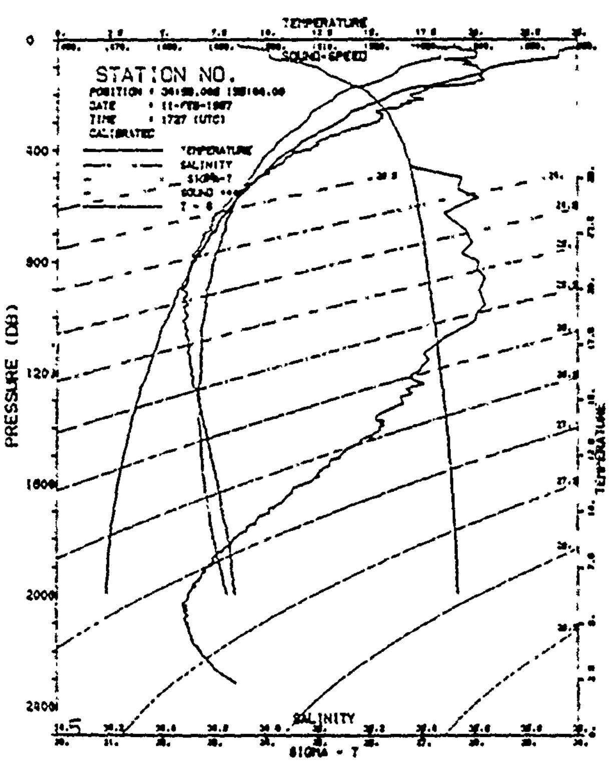


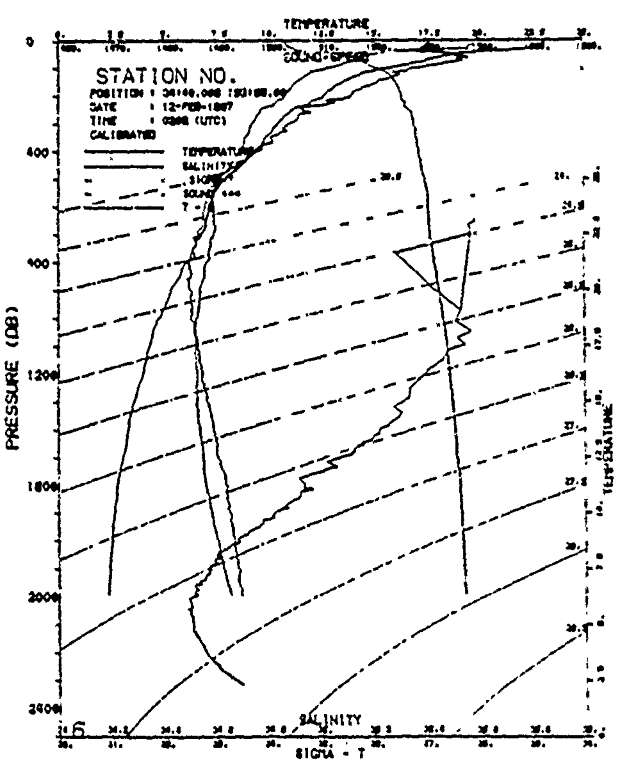
SHIP : HMAS COOK - Plessey
STATION NUMBER : 5 (THROUGH THE CRUISE)
STATION NUMBER : 5 (THROUGH THE YEAR)
DATE : 11-FEB-1987 (DAY NUMBER 42)
START TIME : 1727 GMT = Z
CRUISE : CK10/87
POSITION : 34:59.00S 155:04.00E
CAST DEPTH : METRES
BOTTOM DEPTH : 4733 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	25.523	35.362	23.456	442.30	0.442	1536.21	25.52	39	0.010	0.017
20.0	19.9	25.521	35.361	23.456	442.76	0.885	1536.30	25.52	43	0.028	0.034
30.0	29.8	25.009	35.523	23.736	416.43	1.314	1535.35	25.00	50	0.210	0.169
40.0	39.7	24.217	35.577	24.015	390.16	1.718	1533.66	24.2.	45	0.133	0.085
50.0	49.6	24.116	35.612	24.072	385.13	2.105	1533.68	24.11	42	0.004	0.007
60.0	59.6	24.096	35.611	24.077	385.04	2.490	1533.80	24.08	45	0.003	0.005
70.0	69.5	23.687	35.537	24.142	379.20	2.872	1532.71	23.67	51	0.420	0.407
80.0	79.4	22.466	35.577	24.526	342.91	3.233	1529.83	22.45	49	0.277	0.309
90.0	89.3	21.659	35.574	24.751	321.78	3.566	1527.81	21.64	42	0.275	0.268
100.0	99.3	21.027	35.611	24.953	302.86	3.878	1526.38	21.01	46	0.173	0.179
120.0	119.1	20.347	35.639	25.158	283.99	4.463	1524.95	20.32	57	0.095	0.095
140.0	138.9	19.501	35.635	25.379	263.61	5.014	1522.93	19.48	70	0.130	0.134
160.0	158.8	18.451	35.588	25.611	241.99	5.518	1520.26	18.42	65	0.159	0.182
180.0	178.6	16.853	35.422	25.874	217.32	5.981	1515.77	16.82	55	0.106	0.120
200.0	198.5	16.060	35.358	26.008	205.03	6.401	1513.70	16.04	33	0.089	0.066
220.0	218.3	15.581	35.367	26.126	194.35	6.800	1512.55	15.55	37	0.155	0.198
240.0	238.1	14.864	35.321	26.251	182.86	7.177	1510.67	14.83	37	0.057	0.050
260.0	258.0	14.203	35.221	26.316	177.00	7.538	1508.78	14.17	40	0.114	0.129
280.0	277.8	13.897	35.248	26.402	169.29	7.882	1508.23	13.86	38	0.038	0.028
300.0	297.6	13.515	35.217	26.457	164.42	8.216	1507.30	13.47	27	0.048	0.045
320.0	317.4	13.002	35.148	26.508	159.85	8.541	1505.88	12.96	41	0.103	0.117
340.0	337.3	12.470	35.094	26.572	154.04	8.856	1504.40	12.42	37	0.030	0.029
360.0	357.1	11.964	35.027	26.618	149.86	9.161	1502.97	11.92	40	0.074	0.082
380.0	376.9	11.602	35.000	26.665	145.63	9.457	1502.06	11.55	37	0.022	0.031
400.0	396.7	11.277	34.954	26.690	143.57	9.746	1501.18	11.23	41	0.093	0.106
420.0	416.5	10.815	34.895	26.727	140.10	10.030	1499.89	10.76	35	0.047	0.048
440.0	436.4	10.481	34.869	26.767	136.54	10.307	1499.06	10.43	42	0.039	0.038
460.0	456..	10.224	34.838	26.788	134.81	10.579	1498.42	10.17	32	0.041	0.041
480.0	476.0	9.940	34.810	26.814	132.46	10.846	1497.73	9.88	37	0.022	0.031
500.0	495.8	9.606	34.767	26.837	130.45	11.110	1496.80	9.55	43	0.042	0.045
550.0	545.3	8.928	34.700	26.895	125.20	11.749	1495.10	8.87	38	0.031	0.030
600.0	594.8	8.398	34.647	26.937	121.58	12.366	1493.89	8.33	43	0.032	0.034
700.0	693.8	7.421	34.565	27.017	114.37	13.544	1491.71	7.35	43	0.058	0.057
800.0	792.7	6.555	34.516	27.098	106.87	14.648	1489.95	6.48	46	0.034	0.026
900.0	891.6	5.840	34.482	27.164	100.75	15.688	1488.69	5.76	21	0.038	0.026
1000.0	990.4	5.308	34.498	27.241	93.61	16.657	1488.27	5.22	26	0.016	0.012
1100.0	1089.2	4.782	34.506	27.308	87.17	17.557	1487.77	4.69	24	0.014	0.009
1200.0	1187.9	4.328	34.513	27.364	81.75	18.400	1487.54	4.23	28	0.026	0.020
1300.0	1286.6	3.868	34.545	27.438	74.41	19.176	1487.31	3.77	30	0.011	0.008
1400.0	1385.2	3.486	34.573	27.499	68.39	19.888	1487.38	3.38	37	0.006	0.004
1500.0	1483.8	3.175	34.595	27.546	63.69	20.549	1487.77	3.06	43	0.014	0.012
1600.0	1582.4	2.904	34.619	27.590	59.24	21.162	1488.30	2.79	33	0.007	0.004
1700.0	1680.9	2.718	34.637	27.621	56.28	21.738	1489.19	2.60	38	0.004	0.000
1800.0	1779.3	2.540	34.658	27.653	53.07	22.282	1490.15	2.41	27	0.005	0.004
1900.0	1877.7	2.437	34.671	27.673	51.36	22.800	1491.40	2.30	39	0.005	0.005
1990.0	1966.3	2.355	34.684	27.690	49.88	23.256	1492.50	2.21	37	0.005	0.001

SHIP : HMAS COOK - Plessey
STATION NUMBER : 6 (THROUGH THE CRUISE)
STATION NUMBER : 6 (THROUGH THE YEAR)
DATE : [illegible]-FEB-1987 (DAY NUMBER 43)
START TIME : [illegible] GMT = Z
CRUISE : [illegible]/87
POSITION : 34:40.00S 153:56.00E
CAST DEPTH : METRES
BOTTOM DEPTH : 4068 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
0.0	0.0	23.208	35.598	24.322	359.33	0.000	1530.71	23.21	11	0.005	0.015
10.0	9.9	23.121	35.581	24.341	357.89	0.359	1530.53	23.12	47	0.043	0.042
20.0	19.9	22.872	35.561	24.398	352.89	0.714	1530.02	22.87	48	0.099	0.105
30.0	29.8	22.535	35.530	24.471	346.29	1.064	1529.24	22.53	58	0.144	0.268
40.0	39.7	20.551	35.359	24.890	308.66	1.390	1523.52	20.54	53	0.763	0.702
50.0	49.6	18.944	35.514	25.430	255.59	1.671	1519.75	18.94	53	0.235	0.250
60.0	59.6	18.203	35.559	25.651	234.84	1.916	1517.98	18.19	54	0.153	0.147
70.0	69.5	17.790	35.528	25.752	225.59	2.147	1516.66	17.69	60	0.142	0.126
80.0	79.4	17.238	35.481	25.829	218.48	2.369	1515.40	17.22	55	0.215	0.244
90.0	89.3	16.588	35.422	25.937	208.53	2.582	1513.60	16.57	50	0.184	0.218
100.0	99.3	15.727	35.352	26.082	194.96	2.784	1511.14	15.71	47	0.240	0.257
120.0	119.1	14.496	35.308	26.328	172.74	3.152	1507.75	14.48	58	0.090	0.092
140.0	138.9	13.907	35.244	26.396	165.94	3.490	1506.23	13.89	55	0.076	0.083
160.0	158.8	13.360	35.192	26.469	159.45	3.816	1504.80	13.34	46	0.096	0.096
180.0	178.6	12.990	35.132	26.498	157.17	4.132	1503.83	12.97	31	0.076	0.093
200.0	198.5	12.681	35.117	26.540	152.81	4.441	1503.14	12.65	38	0.034	0.030
220.0	218.3	12.146	35.042	26.594	148.74	4.745	1501.55	12.12	32	0.071	0.039
240.0	238.1	11.572	34.928	26.614	147.09	5.040	1499.75	11.54	31	0.167	0.166
260.0	258.0	11.047	34.953	26.731	136.31	5.322	1498.41	11.01	32	0.029	0.048
280.0	277.8	10.730	34.918	26.761	133.75	5.592	1497.62	10.70	27	0.019	0.019
300.0	297.6	10.501	34.891	26.780	132.24	5.859	1497.08	10.47	37	0.038	0.044
320.0	317.5	10.233	34.865	26.807	129.98	6.123	1496.45	10.19	32	0.017	0.015
340.0	337.3	10.069	34.831	26.808	130.21	6.383	1496.14	10.03	32	0.058	0.061
360.0	357.1	9.845	34.822	26.840	127.49	6.641	1495.67	9.80	33	0.010	0.009
380.0	376.9	9.613	34.778	26.844	127.34	6.896	1495.08	9.57	26	0.049	0.044
400.0	396.7	9.383	34.760	26.868	125.30	7.149	1494.57	9.34	36	0.028	0.032
420.0	416.6	9.120	34.719	26.879	124.44	7.399	1493.87	9.07	31	0.046	0.046
440.0	436.4	8.845	34.683	26.895	123.04	7.646	1493.13	8.80	32	0.050	0.052
460.0	456.2	8.592	34.665	26.921	120.76	7.889	1492.52	8.54	30	0.035	0.040
480.0	476.0	8.253	34.611	26.930	119.91	8.129	1491.47	8.20	31	0.077	0.082
500.0	495.8	7.944	34.601	26.969	116.30	8.364	1490.65	7.89	34	0.050	0.065
550.0	545.3	7.418	34.570	27.021	111.65	8.932	1489.48	7.36	30	0.025	0.023
600.0	594.8	7.250	34.567	27.043	110.22	9.486	1489.66	7.19	30	0.006	0.005
700.0	693.8	6.825	34.539	27.080	107.62	10.581	1489.60	6.76	32	0.012	0.012
800.0	792.7	6.055	34.497	27.149	101.31	11.626	1488.14	5.98	28	0.035	0.033
900.0	891.6	5.330	34.507	27.245	92.11	12.595	1486.90	5.25	29	0.012	0.006
1000.0	990.4	4.764	34.506	27.311	85.87	13.490	1486.22	4.68	29	0.035	0.032
1100.0	1089.2	4.312	34.530	27.379	79.37	14.308	1486.05	4.23	29	0.016	0.014
1200.0	1187.9	3.989	34.548	27.428	74.89	15.077	1486.49	3.90	30	0.008	0.005
1300.0	1286.6	3.569	34.570	27.488	68.91	15.797	1486.28	3.47	27	0.011	0.011
1400.0	1385.3	3.296	34.593	27.532	64.65	16.461	1486.82	3.19	30	0.014	0.012
1500.0	1483.9	3.059	34.609	27.568	61.22	17.091	1487.48	2.95	27	0.012	0.012
1600.0	1582.4	2.790	34.645	27.621	55.98	17.674	1488.04	2.68	30	0.005	0.003
1700.0	1680.9	2.643	34.656	27.643	53.95	18.228	1489.09	2.52	28	0.010	0.007
1800.0	1779.4	2.533	34.670	27.663	52.13	18.757	1490.32	2.41	28	0.000	0.004
1900.0	1877.8	2.405	34.688	27.689	49.76	19.266	1491.43	2.27	30	0.005	0.000
1990.0	1966.3	2.334	34.695	27.700	48.83	19.711	1492.64	2.19	39	0.005	0.001





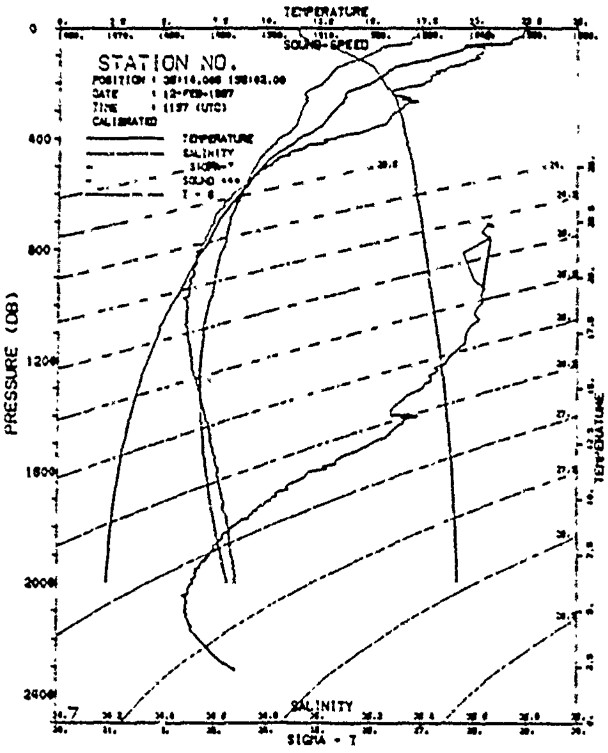
Seamap 5 - Route B - Summer

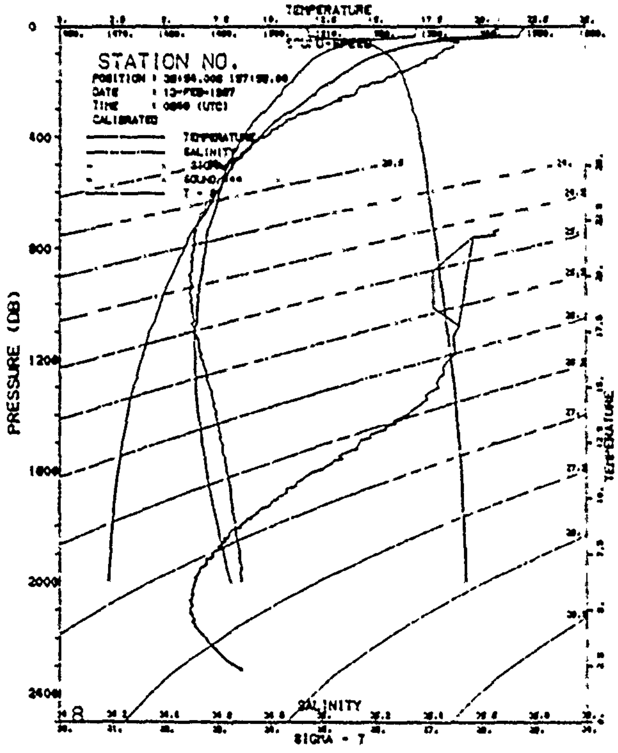
SHIP : HMAS COOK - Plessey
STATION NUMBER : 7 (THROUGH THE CRUISE)
STATION NUMBER : 7 (THROUGH THE YEAR)
DATE : 12-FEB-1987 (DAY NUMBER 43)
START TIME : 1157 GMT = Z
CRUISE : CK18/87
POSITION : 35:14.00S 156:02.00E
CAST DEPTH : METRES
BOTTOM DEPTH : 4775 METRES

PRESS	DEPTH	TEMP		SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	22.373	35.654	24.611	332.23	0.332	1528.71	22.37	58	0.041	0.042
20.0	19.9	22.335	35.667	24.631	330.62	0.663	1528.83	22.33	48	0.070	0.078
30.0	29.8	22.285	35.646	24.630	331.17	0.994	1528.73	23.28	55	0.082	0.124
40.0	39.7	21.777	35.654	24.779	317.32	1.319	1527.63	21.77	48	0.033	0.009
50.0	49.6	21.760	35.664	24.791	316.50	1.636	1527.79	21.75	53	0.002	0.005
60.0	59.6	21.041	35.578	24.925	304.13	1.946	1525.71	21.03	45	0.513	0.560
70.0	69.5	19.561	35.629	25.358	263.13	2.229	1521.99	19.55	65	0.145	0.111
80.0	79.4	19.357	35.631	25.412	258.31	2.490	1521.62	19.34	50	0.094	0.109
90.0	89.3	18.928	35.627	25.520	248.34	2.744	1520.55	18.91	59	0.123	0.132
100.0	99.3	18.439	35.609	25.630	238.20	2.987	1519.32	18.42	74	0.172	0.186
120.0	119.1	17.388	35.572	25.861	216.81	3.443	1516.58	17.37	77	0.221	0.223
140.0	138.9	16.346	35.503	26.055	198.79	3.858	1513.79	16.32	82	0.143	0.151
160.0	158.8	15.841	35.460	26.138	191.42	4.248	1512.60	15.82	59	0.040	0.030
180.0	178.6	15.489	35.434	26.198	186.24	4.626	1511.84	15.46	43	0.045	0.048
200.0	198.5	15.039	35.409	26.280	179.01	4.991	1510.75	15.01	46	0.049	0.053
220.0	218.3	14.346	35.316	26.358	171.89	5.343	1508.76	14.31	44	0.133	0.147
240.0	238.1	13.809	35.287	26.450	163.59	5.678	1507.39	13.77	39	0.032	0.029
260.0	258.0	13.716	35.351	26.519	157.60	5.999	1507.58	13.68	41	0.061	0.102
280.0	277.8	13.519	35.335	26.547	155.36	6.312	1507.23	13.48	47	0.035	0.037
300.0	297.6	13.276	35.304	26.573	153.32	6.621	1506.75	13.23	44	0.033	0.041
320.0	317.4	13.008	35.283	26.611	150.11	6.924	1506.23	12.96	79	0.043	0.040
340.0	337.3	12.834	35.263	26.631	148.66	7.222	1505.98	12.79	38	0.024	0.016
360.0	357.1	12.548	35.210	26.646	147.55	7.519	1505.25	12.50	32	0.067	0.073
380.0	376.9	12.133	35.139	26.672	145.32	7.811	1504.69	12.08	31	0.079	0.100
400.0	396.7	11.567	35.049	26.710	141.88	8.099	1502.40	11.52	33	0.076	0.095
420.0	416.5	11.240	34.971	26.710	142.08	8.381	1501.48	11.19	26	0.093	0.109
440.0	436.4	10.795	34.911	26.743	139.02	8.661	1500.23	10.74	27	0.063	0.066
460.0	456.2	10.429	34.875	26.780	135.70	8.936	1499.27	10.37	33	0.052	0.064
480.0	476.0	10.081	34.829	26.805	133.45	9.205	1498.28	10.02	25	0.040	0.036
500.0	495.8	9.845	34.801	26.823	131.96	9.470	1497.73	9.79	31	0.041	0.039
550.0	545.3	9.237	34.736	26.874	127.57	10.119	1496.32	9.18	35	0.026	0.023
600.0	594.8	8.722	34.673	26.907	124.80	10.752	1495.14	8.66	29	0.036	0.036
700.0	693.8	7.717	34.601	27.003	116.19	11.957	1492.96	7.65	25	0.011	0.007
800.0	792.7	6.949	34.543	27.066	110.58	13.096	1491.55	6.87	31	0.027	0.032
900.0	891.5	6.193	34.517	27.147	103.04	14.159	1490.21	6.11	37	0.018	0.021
1000.0	990.4	5.424	34.494	27.224	95.46	15.158	1488.78	5.34	26	0.025	0.019
1100.0	1089.2	4.795	34.494	27.297	88.22	16.073	1487.85	4.70	32	0.031	0.027
1200.0	1187.9	4.265	34.514	27.372	80.86	16.916	1487.36	4.17	44	0.011	0.004
1300.0	1286.6	3.823	34.537	27.437	74.43	17.692	1487.18	3.72	39	0.013	0.010
1400.0	1385.2	3.491	34.566	27.492	69.02	18.406	1487.48	3.39	35	0.009	0.006
1500.0	1483.8	3.175	34.593	27.544	63.87	19.068	1487.85	3.07	35	0.013	0.008
1600.0	1582.3	2.927	34.617	27.586	59.67	19.683	1488.47	2.81	41	0.007	0.005
1700.0	1680.8	2.725	34.641	27.624	56.02	20.264	1489.31	2.60	33	0.000	0.000
1800.0	1779.3	2.563	34.659	27.652	53.27	20.812	1490.31	2.43	36	0.002	0.005
1900.0	1877.7	2.454	34.672	27.672	51.50	21.335	1491.53	2.32	39	0.004	0.002
2000.0	1976.1	2.360	34.686	27.691	49.86	21.839	1492.72	2.22	23	0.001	0.000

SHIP : HMAS COOK - Plessey
STATION NUMBER : 8 (THROUGH THE CRUISE)
STATION NUMBER : 8 (THROUGH THE YEAR)
DATE : 13-FEB-1987 (DAY NUMBER 44)
START TIME : 0640 GMT = Z
CRUISE : CK18/87
POSITION : 35:54.00S 157:58.00E
CAST DEPTH : METRES
BOTTOM DEPTH : 4707 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
0.0	3.0	22.053	35.666	24.711	322.30	0.000	1527.81	22.05	2	0.000	0.004
10.0	9.9	22.009	35.652	24.712	322.56	0.322	1527.78	22.01	45	0.047	0.064
20.0	19.9	21.859	35.657	24.758	318.52	0.643	1527.55	21.86	52	0.013	0.011
30.0	29.8	21.834	35.655	24.763	318.41	0.961	1527.68	21.83	50	0.009	0.010
40.0	39.7	20.777	35.458	24.905	305.27	1.273	1524.44	20.77	49	0.810	0.907
50.0	49.6	18.277	35.461	25.557	243.42	1.548	1517.75	18.27	52	0.535	0.467
60.0	59.6	17.298	35.502	25.829	217.87	1.778	1515.25	17.29	49	0.249	0.254
70.0	69.5	16.627	35.500	25.987	203.10	1.989	1513.48	16.62	46	0.135	0.121
80.0	79.4	16.158	35.474	26.077	194.87	2.188	1512.25	16.14	68	0.180	0.188
90.0	89.3	15.647	35.460	26.183	185.05	2.378	1510.89	15.63	49	0.102	0.093
100.0	99.2	15.263	35.431	26.247	179.23	2.560	1509.85	15.25	52	0.122	0.122
120.0	119.1	14.599	35.391	26.362	168.77	2.907	1508.16	14.58	57	0.089	0.086
140.0	138.9	14.179	35.363	26.430	162.79	3.238	1507.16	14.16	47	0.070	0.079
160.0	158.8	13.763	35.316	26.482	158.34	3.559	1506.12	13.74	56	0.060	0.066
180.0	178.6	13.321	35.250	26.522	154.98	3.871	1504.98	13.30	34	0.055	0.061
200.0	198.4	13.020	35.205	26.548	152.93	4.178	1504.24	12.99	28	0.068	0.093
220.0	218.3	12.503	35.142	26.602	148.12	4.479	1502.81	12.47	33	0.040	0.044
240.0	238.1	12.264	35.134	26.643	144.71	4.772	1502.35	12.23	34	0.024	0.021
260.0	257.9	11.857	35.071	26.672	142.26	5.061	1501.22	11.82	31	0.047	0.038
280.0	277.8	11.564	35.031	26.696	140.30	5.344	1500.50	11.53	33	0.050	0.053
300.0	297.6	11.200	34.974	26.719	138.39	5.623	1499.49	11.16	38	0.075	0.085
320.0	317.4	10.697	34.903	26.755	135.18	5.897	1497.97	10.66	30	0.067	0.065
340.0	337.2	10.335	34.862	26.787	132.37	6.165	1497.00	10.29	29	0.056	0.047
360.0	357.1	10.060	34.835	26.813	130.18	6.427	1496.32	10.02	31	0.051	0.052
380.0	376.9	9.772	34.807	26.840	127.82	6.685	1495.59	9.73	32	0.024	0.023
400.0	396.7	9.546	34.768	26.848	127.36	6.940	1495.04	9.50	32	0.068	0.071
420.0	416.5	9.249	34.738	26.873	125.11	7.192	1494.28	9.20	31	0.029	0.029
440.0	436.3	9.043	34.717	26.890	123.74	7.441	1493.82	8.99	30	0.040	0.036
460.0	456.1	8.762	34.691	26.914	121.58	7.686	1493.06	8.71	29	0.028	0.029
480.0	475.9	8.511	34.649	26.921	121.05	7.928	1492.40	8.46	32	0.066	0.059
500.0	495.8	8.277	34.647	26.955	117.99	8.167	1491.89	8.22	36	0.022	0.015
550.0	545.3	7.905	34.612	26.984	115.73	8.752	1491.25	7.85	30	0.030	0.032
600.0	594.8	7.486	34.581	27.021	112.57	9.324	1490.42	7.43	35	0.025	0.023
700.0	693.7	6.680	34.530	27.092	106.25	10.422	1488.90	6.61	27	0.025	0.027
800.0	792.6	5.951	34.511	27.172	98.90	11.444	1487.65	5.88	34	0.019	0.014
900.0	891.5	5.357	34.502	27.239	92.80	12.404	1486.88	5.28	33	0.012	0.008
1000.0	990.3	4.772	34.509	27.312	85.77	13.297	1486.17	4.69	30	0.007	0.006
1100.0	1089.1	4.241	34.515	27.375	79.60	14.130	1485.63	4.16	29	0.021	0.016
1200.0	1187.8	3.869	34.544	27.437	73.70	14.895	1485.76	3.78	32	0.012	0.007
1300.0	1286.5	3.487	34.572	27.497	67.76	15.605	1485.84	3.39	32	0.016	0.011
1400.0	1385.1	3.216	34.597	27.543	63.37	16.258	1486.37	3.11	33	0.007	0.004
1500.0	1483.7	2.959	34.623	27.588	59.04	16.873	1486.96	2.85	34	0.006	0.008
1600.0	1582.3	2.765	34.638	27.617	56.20	17.451	1487.82	2.65	30	0.006	0.003
1700.0	1680.7	2.619	34.656	27.645	53.44	17.997	1488.88	2.50	36	0.005	0.001
1800.0	1779.2	2.493	34.670	27.666	51.67	18.523	1490.03	2.37	34	0.003	0.003
1900.0	1877.6	2.393	34.689	27.690	49.53	19.029	1491.28	2.26	37	0.004	0.003
2000.0	1976.0	2.320	34.693	27.699	48.86	19.519	1492.62	2.18	22	0.000	0.001



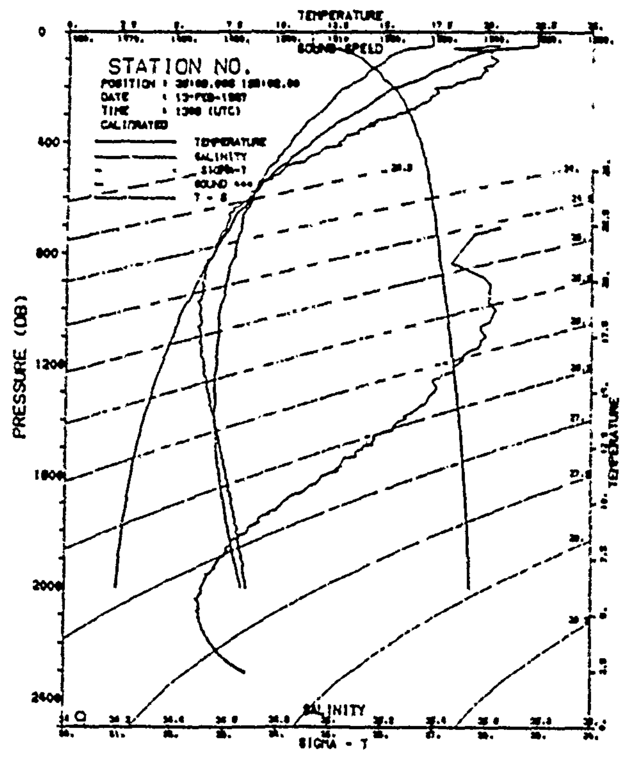


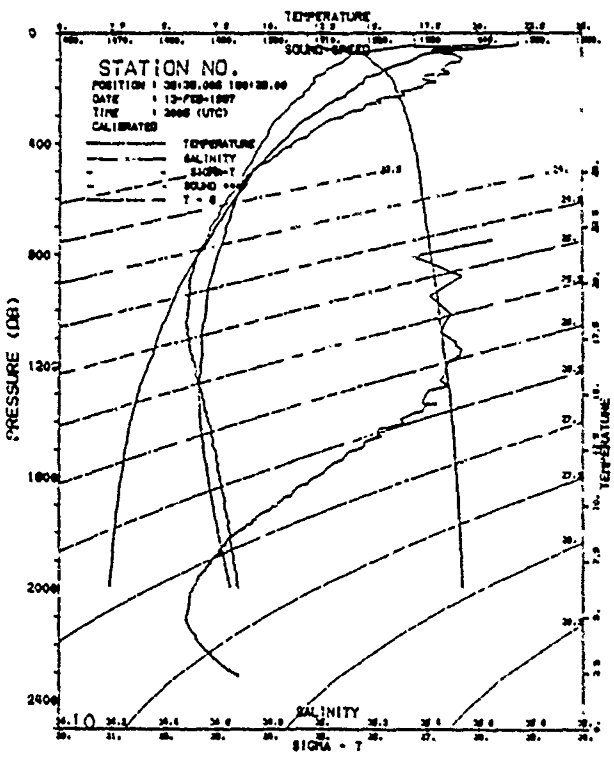
SHIP : HMAS COOK - Plessey
STATION NUMBER : 9 (THROUGH THE CRUISE)
STATION NUMBER : 9 (THROUGH THE YEAR)
DATE : 13-FEB-1987 (DAY NUMBER 44)
START TIME : 1309 GMT = Z
CRUISE : CK18/87
POSITION : 36:09.00S 159:02.00E
CAST DEPTH : METRES
BOTTOM DEPTH : 5089 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	22.304	35.647	24.603	332.99	0.333	1528.76	22.30	37	0.004	0.005
20.0	19.9	22.300	35.649	24.606	333.09	0.666	1528.89	22.30	43	0.005	0.003
30.0	29.8	22.304	35.648	24.603	333.66	0.999	1529.08	22.30	37	0.004	0.005
40.0	39.7	22.306	35.644	24.600	334.40	1.333	1529.23	22.30	45	0.001	0.003
50.0	49.6	22.333	35.609	24.580	335.87	1.660	1529.14	22.32	44	0.106	0.167
60.0	59.6	21.032	35.504	24.871	309.27	1.991	1525.51	21.02	49	0.645	0.649
70.0	69.5	19.942	35.607	25.241	274.31	2.283	1523.02	19.93	53	0.162	0.153
80.0	79.4	19.440	35.611	25.374	262.02	2.551	1521.79	19.43	43	0.146	0.142
90.0	89.3	19.037	35.607	25.477	252.50	2.808	1520.80	19.02	45	0.103	0.096
100.0	99.2	18.763	35.627	25.562	244.72	3.057	1520.23	18.75	40	0.074	0.067
120.0	119.1	18.186	35.607	25.692	232.94	3.535	1518.89	18.17	56	0.082	0.094
140.0	138.9	17.455	35.580	25.857	217.85	3.987	1517.07	17.43	58	0.108	0.119
160.0	158.8	17.042	35.560	25.942	210.37	4.414	1516.20	17.02	57	0.036	0.037
180.0	178.6	16.407	35.499	26.038	201.68	4.829	1514.54	16.38	45	0.104	0.115
200.0	198.4	15.718	35.422	26.137	192.70	5.221	1512.66	15.69	32	0.128	0.156
220.0	218.3	15.092	35.401	26.262	181.28	5.594	1511.07	15.06	36	0.076	0.073
240.0	238.1	14.707	35.374	26.325	175.73	5.951	1510.15	14.67	32	0.054	0.060
260.0	257.9	14.345	35.343	26.379	171.04	6.297	1509.33	14.31	37	0.058	0.060
280.0	277.8	13.972	35.292	26.419	167.65	6.635	1508.41	13.93	35	0.104	0.111
300.0	297.6	13.440	35.241	26.491	161.15	6.964	1506.95	13.40	39	0.085	0.085
320.0	317.4	12.929	35.168	26.538	156.97	7.282	1505.54	12.89	37	0.083	0.079
340.0	337.2	12.599	35.144	26.585	152.86	7.591	1504.78	12.55	32	0.059	0.080
360.0	357.1	12.245	35.097	26.618	150.05	7.894	1503.86	12.20	30	0.048	0.055
380.0	376.9	11.833	35.049	26.659	146.33	8.191	1502.77	11.78	31	0.060	0.060
400.0	396.7	11.538	35.027	26.698	142.96	8.480	1502.08	11.48	32	0.036	0.041
420.0	416.5	11.206	34.974	26.718	141.30	8.764	1501.19	11.15	34	0.079	0.084
440.0	436.3	10.885	34.948	26.757	137.86	9.042	1500.43	10.83	32	0.037	0.040
460.0	456.1	10.543	34.901	26.781	135.71	9.317	1499.52	10.49	33	0.032	0.032
480.0	475.9	10.190	34.833	26.789	135.05	9.588	1498.49	10.13	34	0.075	0.079
500.0	495.7	9.848	34.810	26.830	131.28	9.854	1497.63	9.79	35	0.024	0.021
550.0	545.2	9.178	34.733	26.881	126.83	10.503	1495.96	9.12	32	0.018	0.015
600.0	594.7	8.679	34.680	26.919	123.64	11.131	1494.90	8.61	30	0.022	0.021
700.0	693.7	7.707	34.603	27.005	115.93	12.328	1492.84	7.64	35	0.007	0.009
800.0	792.6	6.958	34.552	27.072	110.03	13.458	1491.51	6.88	33	0.017	0.016
900.0	891.5	6.174	34.511	27.144	103.26	14.522	1490.04	6.09	28	0.021	0.015
1000.0	990.3	5.456	34.504	27.228	95.13	15.516	1488.81	5.37	29	0.019	0.015
1100.0	1089.1	4.994	34.505	27.284	90.00	16.441	1488.59	4.90	35	0.017	0.015
1200.0	1187.8	4.507	34.516	27.347	83.81	17.310	1488.24	4.41	31	0.018	0.019
1300.0	1286.5	4.036	34.535	27.413	77.30	18.113	1487.98	3.93	32	0.011	0.008
1400.0	1385.1	3.629	34.560	27.474	71.17	18.856	1487.96	3.5	34	0.013	0.011
1500.0	1483.7	3.303	34.582	27.523	66.18	19.542	1488.25	3.19	29	0.011	0.010
1600.0	1582.2	3.054	34.604	27.564	62.19	20.183	1488.90	2.94	35	0.005	0.004
1700.0	1680.7	2.856	34.625	27.599	58.86	20.787	1489.76	2.7	36	0.007	0.006
1800.0	1779.2	2.667	34.643	27.630	55.73	21.357	1490.62	2.54	30	0.005	0.004
1900.0	1877.6	2.523	34.660	27.656	53.29	21.901	1491.72	2.39	32	0.004	0.001
2000.0	1975.9	2.422	34.682	27.682	50.95	22.422	1493.01	2.28	342	0.003	0.002
2010.0	1985.7	2.421	34.677	27.679	51.30	22.473	1493.09	2.28	4	0.000	0.000

SHIP : HMAS COOK - Plessey
STATION NUMBER : 10 (THROUGH THE CRUISE)
STATION NUMBER : 10 (THROUGH THE YEAR)
DATE : 13-FEB-1987 (DAY NUMBER 44)
START TIME : 2005 GMT = Z
CRUISE : C710/87
POSITION : 36:36.00S 160:29.00E
CAST DEPTH : METRES
BOTTOM DEPTH : 4863 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	21.911	35.652	24.740	319.91	0.320	1527.55	21.91	40	0.000	0.008
20.0	19.9	21.920	35.651	24.737	320.59	0.640	1527.73	21.92	51	0.003	0.004
30.0	29.8	21.920	35.651	24.737	320.97	0.961	1527.90	21.91	46	0.002	0.004
40.0	39.7	21.903	35.642	24.734	321.55	1.282	1527.98	21.90	49	0.017	0.042
50.0	49.6	20.906	35.413	24.835	312.27	1.599	1524.82	20.90	42	0.501	0.459
60.0	59.5	19.523	35.470	25.246	273.41	1.892	1521.32	19.51	50	0.491	0.513
70.0	69.5	18.108	35.466	25.603	239.70	2.148	1517.49	18.10	42	0.402	0.415
80.0	79.4	17.312	35.513	25.834	218.01	2.377	1515.57	17.30	54	0.092	0.096
90.0	89.3	17.007	35.535	25.924	209.79	2.591	1514.83	16.99	46	0.069	0.072
100.0	99.2	16.796	35.529	25.970	205.73	2.799	1514.35	16.78	49	0.063	0.064
120.0	119.1	16.023	35.474	26.109	193.06	3.199	1512.31	16.00	56	0.095	0.096
140.0	138.9	15.429	35.409	26.254	179.77	3.573	1510.90	15.41	49	0.022	0.017
160.0	158.8	14.682	35.389	26.342	171.81	3.928	1508.80	14.66	52	0.050	0.051
180.0	178.6	14.531	35.408	26.390	167.88	4.266	1508.67	14.50	44	0.082	0.107
200.0	198.4	14.158	35.363	26.435	164.01	4.597	1507.79	14.13	36	0.035	0.037
220.0	218.3	13.728	35.319	26.492	159.07	4.922	1506.70	13.70	35	0.027	0.039
240.0	238.1	13.247	35.210	26.508	158.04	5.240	1505.31	13.21	38	0.106	0.099
260.0	257.9	12.798	35.165	26.561	153.14	5.550	1504.11	12.76	29	0.063	0.061
280.0	277.8	12.499	35.126	26.591	150.75	5.853	1503.43	12.46	33	0.069	0.091
300.0	297.6	12.060	35.084	26.643	146.04	6.150	1502.25	12.02	36	0.050	0.068
320.0	317.4	11.618	35.020	26.678	143.04	6.439	1501.01	11.58	36	0.057	0.061
340.0	337.2	11.351	34.989	26.704	140.90	6.723	1500.41	11.31	32	0.030	0.037
360.0	357.0	11.092	34.954	26.723	139.33	7.004	1499.84	11.05	28	0.039	0.047
380.0	376.9	10.884	34.924	26.738	138.29	7.280	1499.39	10.84	28	0.051	0.050
400.0	396.7	10.539	34.888	26.771	135.35	7.554	1498.51	10.49	36	0.044	0.039
420.0	416.5	10.262	34.852	26.791	133.64	7.823	1497.82	10.21	33	0.040	0.039
440.0	436.3	10.019	34.830	26.817	131.46	8.088	1497.26	9.97	34	0.024	0.025
460.0	456.1	9.791	34.799	26.831	130.32	8.350	1496.76	9.74	34	0.023	0.028
480.0	475.9	9.514	34.756	26.844	129.27	8.611	1496.03	9.46	36	0.048	0.050
500.0	495.7	9.235	34.737	26.874	126.53	8.866	1495.34	9.18	34	0.023	0.022
550.0	545.2	8.859	34.688	26.897	124.99	9.495	1494.75	8.80	29	0.027	0.029
600.0	594.7	8.357	34.640	26.930	121.44	10.112	1493.66	8.29	30	0.031	0.032
700.0	693.7	7.484	34.576	27.017	114.55	11.292	1491.92	7.41	31	0.024	0.022
800.0	792.6	6.633	34.527	27.096	107.21	12.402	1490.23	6.56	28	0.021	0.023
900.0	891.4	5.829	34.500	27.180	99.27	13.435	1488.60	5.75	31	0.027	0.025
1000.0	990.3	5.257	34.489	27.240	93.58	14.395	1488.01	5.17	26	0.007	0.009
1100.0	1089.0	4.652	34.496	27.316	86.16	15.294	1487.18	4.56	33	0.010	0.006
1200.0	1187.7	4.192	34.521	27.385	79.40	16.128	1486.97	4.10	32	0.013	0.010
1300.0	1286.4	3.726	34.547	27.454	72.51	16.890	1486.62	3.63	32	0.008	0.005
1400.0	1385.0	3.404	34.572	27.506	67.45	17.591	1487.00	3.30	31	0.016	0.013
1500.0	1483.6	3.129	34.600	27.554	62.79	18.243	1487.58	3.02	31	0.007	0.004
1600.0	1582.2	2.950	34.615	27.582	60.15	18.859	1488.46	2.83	33	0.005	0.005
1700.0	1680.6	2.769	34.634	27.614	57.10	19.443	1489.37	2.65	35	0.007	0.004
1800.0	1779.1	2.608	34.655	27.644	54.18	19.999	1490.41	2.48	28	0.005	0.002
1900.0	1877.5	2.499	34.665	27.662	52.60	20.533	1491.61	2.36	33	0.005	0.003
1990.0	1966.0	2.392	34.687	27.689	50.15	20.995	1492.69	2.25	93	0.002	0.004



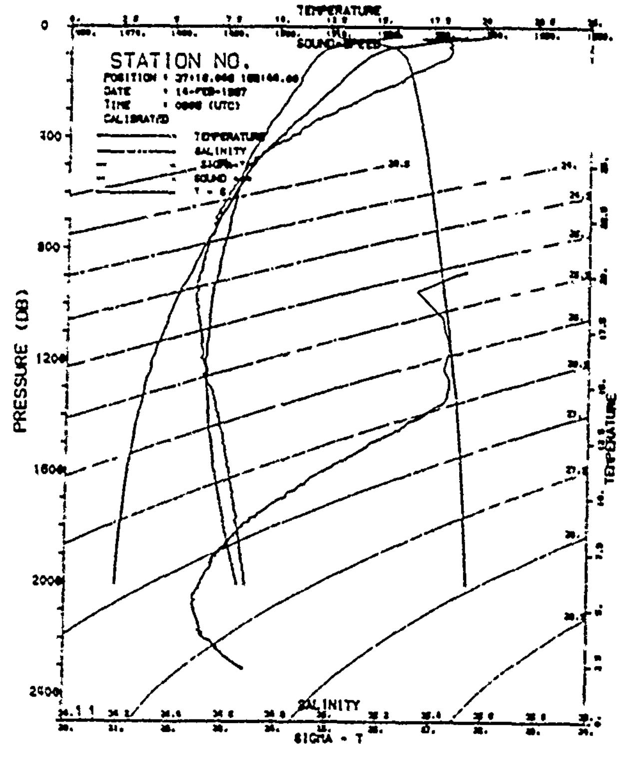


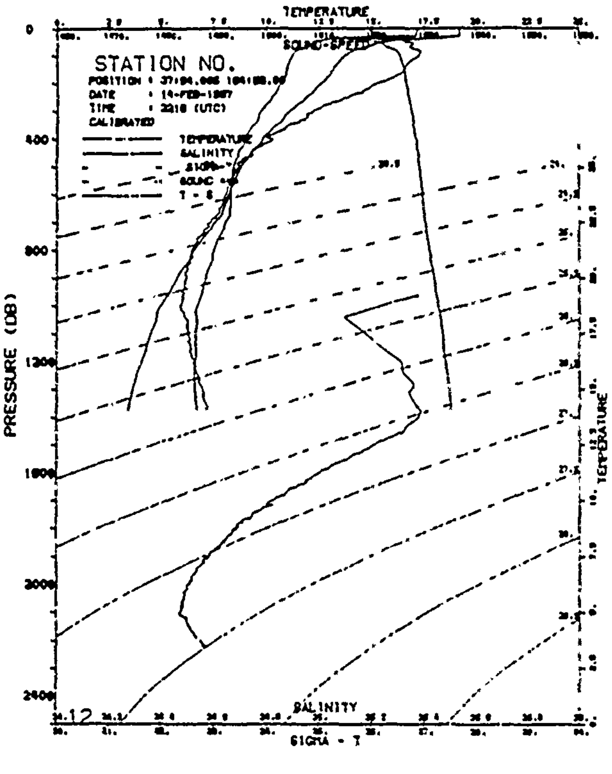
SHIP : HMAS COOK - Plessey
STATION NUMBER : 11. (THROUGH THE CRUISE)
STATION NUMBER : 11 (THROUGH THE YEAR)
DATE : 14-FEB-1987 (DAY NUMBER 45)
START TIME : 0906 GMT = Z
CRUISE : CK18/87
POSITION : 37:16.00S 162:44.00E
CAST DEPTH : METRES
BOTTOM DEPTH : 3030 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	20.196	35.527	25.113	284.34	0.284	1522.81	20.19	37	0.005	0.005
20.0	19.9	20.193	35.526	25.113	284.74	0.569	1522.93	20.19	41	0.003	0.003
30.0	29.8	20.109	35.523	25.112	285.19	0.854	1523.25	20.18	36	0.004	0.007
40.0	39.7	19.677	35.415	25.164	280.53	1.137	1521.43	19.67	51	0.569	0.666
50.0	49.6	17.975	35.449	25.623	237.15	1.395	1516.87	17.97	48	0.321	0.328
60.0	59.5	16.924	35.469	25.894	211.70	1.620	1514.00	16.91	47	0.276	0.258
70.0	69.5	16.030	35.452	26.090	193.33	1.822	1511.39	16.02	55	0.310	0.330
80.0	79.4	15.267	35.468	26.275	175.98	2.007	1509.33	15.25	52	0.137	0.129
90.0	89.3	14.926	35.470	26.352	168.95	2.179	1508.46	14.91	43	0.091	0.093
100.0	99.2	14.647	35.461	26.406	164.06	2.346	1507.76	14.63	70	0.087	0.085
120.0	119.1	14.230	35.435	26.475	157.96	2.667	1506.80	14.21	65	0.052	0.062
140.0	138.9	13.843	35.380	26.515	154.72	2.980	1505.86	13.82	68	0.059	0.063
160.0	158.8	13.532	35.333	26.543	152.53	3.287	1505.16	13.51	42	0.045	0.053
180.0	178.6	13.233	35.289	26.570	150.39	3.590	1504.45	13.21	37	0.047	0.056
200.0	198.4	13.015	35.264	26.595	148.45	3.888	1504.05	12.99	35	0.035	0.038
220.0	218.3	12.704	35.213	26.618	146.76	4.183	1503.31	12.67	37	0.045	0.048
240.0	238.1	12.357	35.160	26.645	144.52	4.475	1502.40	12.33	31	0.039	0.043
260.0	257.9	12.072	35.114	26.665	143.06	4.763	1501.76	12.04	34	0.054	0.058
280.0	277.7	11.813	35.075	26.683	141.66	5.047	1501.14	11.78	28	0.045	0.041
300.0	297.6	11.495	35.029	26.707	139.70	5.328	1500.36	11.46	39	0.049	0.047
320.0	317.4	11.216	34.982	26.723	138.55	5.606	1499.65	11.18	39	0.068	0.077
340.0	337.2	10.861	34.936	26.751	136.12	5.881	1498.71	10.82	35	0.046	0.051
360.0	357.0	10.610	34.904	26.771	134.49	6.151	1498.13	10.57	29	0.043	0.051
380.0	376.8	10.379	34.882	26.795	132.57	6.418	1497.64	10.33	26	0.015	0.013
400.0	396.6	10.107	34.840	26.809	131.40	6.682	1496.95	10.06	32	0.042	0.035
420.0	416.5	9.825	34.797	26.823	130.25	6.944	1496.22	9.78	28	0.043	0.061
440.0	436.3	9.521	34.767	26.851	127.80	7.201	1495.42	9.47	37	0.035	0.033
460.0	456.1	9.248	34.735	26.871	126.09	7.456	1494.74	9.20	38	0.031	0.027
480.0	475.9	9.016	34.711	26.890	124.49	7.707	1494.22	8.96	40	0.026	0.023
500.0	495.7	8.834	34.681	26.895	124.16	7.955	1493.81	8.78	32	0.040	0.040
550.0	545.2	8.413	34.651	26.937	120.66	8.565	1493.10	8.35	34	0.025	0.027
600.0	594.7	7.965	34.612	26.975	117.47	9.159	1492.19	7.90	33	0.031	0.023
700.0	693.6	7.182	34.566	27.051	110.83	10.303	1490.80	7.11	29	0.007	0.007
800.0	792.5	6.452	34.529	27.122	104.48	11.383	1489.56	6.38	48	0.019	0.017
900.0	891.4	5.792	34.498	27.182	98.92	12.399	1488.52	5.71	26	0.027	0.022
1000.0	990.2	5.107	34.492	27.260	91.37	13.347	1487.42	5.02	32	0.024	0.021
1100.0	1089.0	4.585	34.509	27.333	84.40	14.225	1486.95	4.50	43	0.009	0.006
1200.0	1187.7	4.058	34.516	27.395	78.14	15.037	1486.41	3.97	22	0.016	0.010
1300.0	1286.3	3.686	34.547	27.458	72.02	15.791	1486.53	3.59	26	0.010	0.009
1400.0	1385.0	3.395	34.580	27.512	66.82	16.486	1487.02	3.29	35	0.007	0.010
1500.0	1483.5	3.130	34.597	27.552	62.97	17.131	1487.57	3.02	31	0.009	0.008
1600.0	1582.1	2.907	34.621	27.591	59.18	17.740	1488.33	2.79	36	0.006	0.003
1700.0	1680.5	2.742	34.638	27.619	56.49	18.317	1489.28	2.62	40	0.008	0.004
1800.0	1779.0	2.592	34.657	27.648	53.80	18.869	1490.33	2.46	30	0.005	0.004
1900.0	1877.4	2.465	34.673	27.671	51.62	19.396	1491.49	2.33	32	0.004	0.000
2000.0	1975.7	2.367	34.689	27.693	49.70	19.904	1492.77	2.22	39	0.006	0.005
2010.0	1985.5	2.361	34.686	27.691	49.09	19.954	1492.87	2.22	25	0.000	0.004

SHIP : HMAS COOK - Plessey
STATION NUMBER : 12 (THROUGH THE CRUISE)
STATION NUMBER : 12 (THROUGH THE YEAR)
DATE : 14-FEB-1987 (DAY NUMBER 45)
START TIME : 2216 GMT = Z
CRUISE : CK18/87
POSITION : 37:54.00S 164:59.00E
CAST DEPTH : METRES
BOTTOM DEPTH : 1433 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	19.182	35.373	25.261	270.31	0.270	1519.88	19.18	56	0.003	0.003
20.0	19.8	19.188	35.367	25.254	271.26	0.541	1519.97	19.18	54	0.003	0.004
30.0	29.8	19.177	35.356	25.249	272.07	0.813	1520.06	19.17	49	0.029	0.067
40.0	39.7	17.012	35.183	25.653	233.96	1.066	1513.28	17.01	49	0.989	0.853
50.0	49.6	15.502	35.343	26.125	189.30	1.277	1509.40	15.49	44	0.241	0.223
60.0	59.5	15.088	35.352	26.224	180.14	1.462	1508.35	15.08	44	0.089	0.086
70.0	69.5	14.672	35.348	26.313	172.01	1.638	1507.17	14.66	36	0.158	0.153
80.0	79.4	14.159	35.379	26.448	159.46	1.804	1505.78	14.15	51	0.119	0.104
90.0	89.3	13.926	35.385	26.501	154.63	1.961	1505.23	13.91	41	0.045	0.051
100.0	99.2	13.751	35.379	26.533	151.86	2.114	1504.85	13.74	63	0.039	0.037
120.0	119.1	13.490	35.355	26.569	148.98	2.415	1504.33	13.47	39	0.021	0.028
140.0	138.9	13.245	35.325	26.596	146.89	2.712	1503.87	13.23	53	0.039	0.041
160.0	158.7	13.075	35.318	26.624	144.67	3.003	1503.66	13.05	55	0.017	0.017
180.0	178.6	12.891	35.284	26.635	144.13	3.292	1503.38	12.87	45	0.031	0.035
200.0	198.4	12.611	35.224	26.645	143.65	3.580	1502.68	12.58	35	0.045	0.052
220.0	218.2	12.328	35.186	26.671	141.58	3.865	1502.06	12.30	35	0.025	0.028
240.0	238.1	12.085	35.136	26.679	141.22	4.148	1501.49	12.05	37	0.065	0.079
260.0	257.9	11.765	35.089	26.704	139.24	4.428	1500.70	11.73	23	0.040	0.040
280.0	277.7	11.400	35.028	26.724	137.57	4.706	1499.71	11.36	30	0.049	0.062
300.0	297.5	11.057	34.973	26.745	135.92	4.980	1498.79	11.02	29	0.040	0.034
320.0	317.4	10.837	34.956	26.771	133.73	5.250	1498.37	10.80	35	0.010	0.010
340.0	337.2	10.670	34.920	26.773	133.89	5.517	1498.04	10.63	28	0.030	0.027
360.0	357.0	10.300	34.873	26.801	131.44	5.783	1497.05	10.26	29	0.032	0.029
380.0	376.8	10.056	34.831	26.811	130.79	6.045	1496.45	10.01	29	0.049	0.050
400.0	396.6	9.808	34.810	26.843	128.00	6.305	1495.91	9.76	27	0.006	0.009
420.0	416.4	9.664	34.786	26.842	128.39	6.562	1495.67	9.62	29	0.039	0.043
440.0	436.2	9.361	34.745	26.860	126.78	6.817	1494.83	9.31	30	0.055	0.053
460.0	456.1	9.212	34.743	26.883	124.92	7.068	1494.65	9.16	28	0.005	0.009
480.0	475.9	9.018	34.708	26.887	124.76	7.318	1494.19	8.97	29	0.026	0.023
500.0	495.7	8.813	34.699	26.912	122.53	7.566	1493.79	8.76	34	0.013	0.014
550.0	545.2	8.517	34.671	26.937	120.83	8.175	1493.51	8.46	31	0.018	0.016
600.0	594.7	8.245	34.646	26.959	119.27	8.776	1493.28	8.18	28	0.010	0.010
700.0	693.6	7.555	34.589	27.017	114.64	9.951	1492.24	7.48	34	0.028	0.025
800.0	792.5	6.585	34.519	27.097	107.09	11.062	1490.04	6.51	31	0.025	0.024
900.0	891.3	5.779	34.497	27.183	98.83	12.093	1488.48	5.70	35	0.027	0.024
1000.0	990.1	5.004	34.475	27.259	91.29	13.045	1486.95	4.92	39	0.033	0.034
1100.0	1088.9	4.501	34.504	27.338	83.67	13.916	1486.58	4.41	33	0.010	0.005
1200.0	1187.6	4.099	34.527	27.400	77.81	14.726	1486.60	4.01	38	0.014	0.010
1300.0	1286.3	3.658	34.556	27.468	71.00	15.470	1486.44	3.56	55	0.004	0.003
1370.0	1355.3	3.473	34.574	27.500	67.98	15.955	1486.86	3.37	97	0.000	0.004



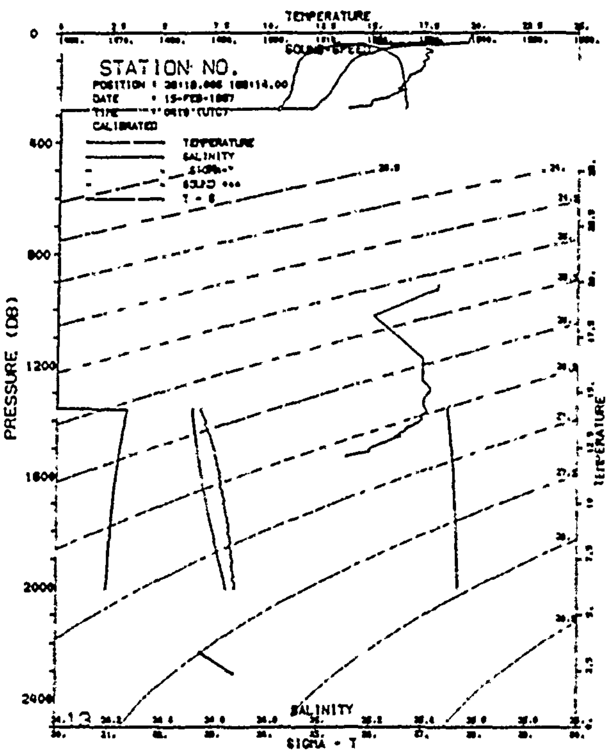


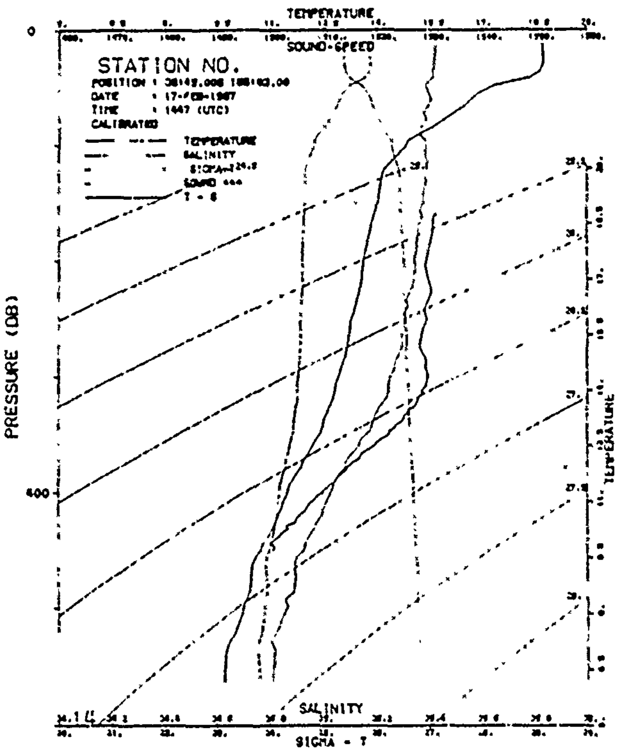
SHIP : HMAS COOK - Plessey
STATION NUMBER : 13 (THROUGH THE CRUISE)
STATION NUMBER : 13 (THROUGH THE YEAR)
DATE : 15-FEB-1987 (DAY NUMBER 46)
START TIME : 0410 GMT - Z
CRUISE : CF19/87
POSITION : 38:19.00S 166:14.00E
CAST DEPTH : METRES
BOTTOM DEPTH : 2575 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	19.754	35.458	25.178	278.23	0.278	1521.49	19.75	39	0.027	0.030
20.0	19.8	19.664	35.463	25.204	276.02	0.555	1521.42	19.66	54	0.013	0.010
30.0	29.8	19.642	35.461	25.209	275.92	0.831	1521.54	19.64	56	0.007	0.007
40.0	39.7	18.943	35.311	25.275	269.99	1.104	1519.10	18.94	40	0.893	1.001
50.0	49.6	16.437	35.391	25.940	206.17	1.342	1512.25	16.43	49	0.251	0.263
60.0	59.5	15.557	35.417	26.171	185.30	1.538	1509.85	15.55	57	0.227	0.229
70.0	69.5	15.098	35.434	26.286	174.60	1.718	1508.67	15.09	56	0.081	0.095
80.0	79.4	14.610	35.404	26.370	166.86	1.889	1507.27	14.60	51	0.132	0.134
90.0	89.3	14.227	35.414	26.460	158.50	2.051	1506.29	14.21	45	0.064	0.061
100.0	99.2	14.044	35.410	26.495	155.47	2.208	1505.88	14.93	51	0.058	0.062
120.0	119.1	13.792	35.401	26.541	151.62	2.515	1505.42	13.77	61	0.035	0.038
140.0	138.9	13.624	35.378	26.559	150.51	2.817	1505.20	13.60	55	0.031	0.039
160.0	158.7	13.384	35.340	26.579	149.06	3.117	1504.70	13.36	33	0.022	0.017
180.0	178.6	13.259	35.328	26.595	148.04	3.414	1504.63	13.23	26	0.020	0.022
200.0	198.4	13.085	35.304	26.612	146.89	3.709	1504.32	13.06	30	0.030	0.042
220.0	218.2	12.947	35.292	26.630	145.65	4.000	1504.21	12.92	30	0.034	0.033
240.0	238.1	12.718	35.239	26.635	145.65	4.291	1503.68	12.69	33	0.059	0.079
260.0	257.9	12.390	35.201	26.670	142.69	4.580	1502.92	12.36	32	0.015	0.017
280.0	277.7	11.987	35.102	26.672	142.83	4.867	1501.67	11.95	29	0.060	0.057
300.0	297.5	11.663	35.077	26.714	139.18	5.148	1500.93	11.62	32	0.023	0.026
320.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
340.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
360.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
380.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
400.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
420.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
440.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
460.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
480.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
500.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
550.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
600.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
700.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
800.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
900.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
1000.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
1100.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
1200.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
1300.0	0.0	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0	0.000	0.000
1400.0	1384.8	3.252	34.572	27.520	65.60	16.432	1486.19	3.15	28	0.008	0.003
1500.0	1483.4	3.012	34.601	27.565	61.29	17.068	1486.84	2.90	25	0.005	0.005
1600.0	1581.9	2.806	34.628	27.606	57.41	17.661	1487.69	2.69	28	0.006	0.003
1700.0	1680.4	2.660	34.643	27.631	55.11	18.224	1488.74	2.54	28	0.005	0.005
1800.0	1778.8	2.533	34.662	27.657	52.72	18.761	1489.90	2.41	31	0.000	0.001
1900.0	1877.2	2.448	34.677	27.676	51.10	19.281	1491.21	2.31	25	0.005	0.003
2000.0	1975.5	2.347	34.685	27.691	49.75	19.787	1492.46	2.21	75	0.005	0.004
2010.0	1985.4	2.336	34.685	27.692	49.69	19.837	1492.56	2.19	24	0.005	0.003

SHIP : HMAS COOK - Plessey
STATION NUMBER : 14 (THROUGH THE CRUISE)
STATION NUMBER : 14 (THROUGH THE YEAR)
DATE : 17-FEB-1987 (DAY NUMBER 48)
START TIME : 1447 GMT - Z
CRUISE : CR18/87
POSITION : 38:45.00S 168:03.00E
CAST DEPTH : METRES
BOTTOM DEPTH : 584 METRES

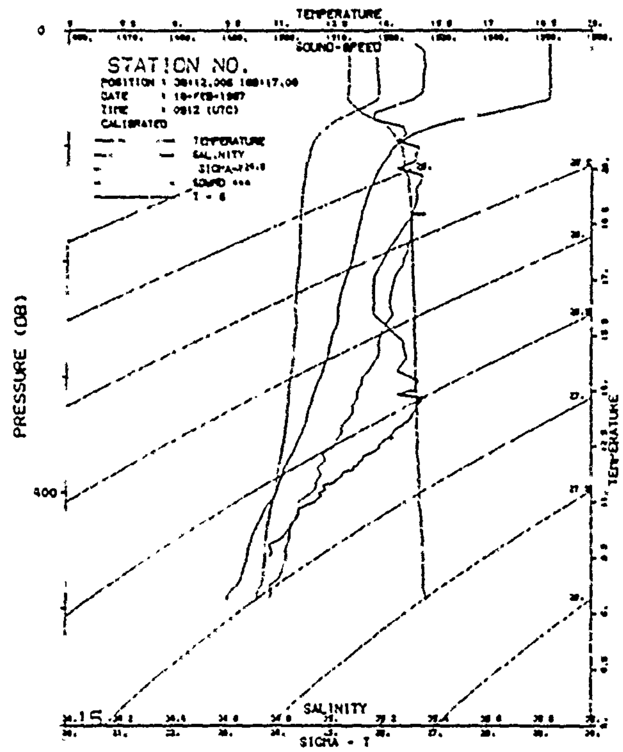
PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	18.737	35.427	25.416	255.54	0.255	1510.66	18.73	58	0.003	0.003
20.0	19.8	18.743	35.425	25.413	256.19	0.511	1510.79	18.74	54	0.007	0.009
30.0	29.8	18.735	35.420	25.411	256.71	0.768	1510.92	18.73	67	0.031	0.033
40.0	39.7	18.442	35.417	25.483	250.21	1.021	1510.21	18.44	86	0.258	0.254
50.0	49.6	17.214	35.390	25.763	223.88	1.258	1514.67	17.21	84	0.330	0.331
60.0	59.5	16.699	35.412	25.903	210.83	1.475	1513.34	16.69	46	0.099	0.099
70.0	69.5	16.293	35.387	25.978	203.91	1.683	1512.28	16.28	52	0.139	0.139
80.0	79.4	15.836	35.386	26.083	194.22	1.882	1511.04	15.82	54	0.136	0.133
90.0	89.3	15.210	35.372	26.213	182.15	2.070	1509.21	15.20	47	0.246	0.243
100.0	99.2	14.819	35.389	26.313	172.92	2.248	1508.28	14.80	47	0.040	0.048
120.0	119.1	14.263	35.391	26.434	161.87	2.583	1506.84	14.25	53	0.060	0.060
140.0	138.9	14.090	35.381	26.463	159.63	2.903	1506.66	14.07	50	0.015	0.018
160.0	158.7	13.949	35.371	26.486	158.04	3.221	1506.53	13.93	41	0.040	0.038
180.0	178.6	13.777	35.356	26.510	156.25	3.535	1506.28	13.75	34	0.019	0.014
200.0	198.4	13.633	35.348	26.534	154.51	3.846	1506.15	13.60	25	0.013	0.007
220.0	218.2	13.559	35.340	26.543	154.16	4.155	1506.20	13.53	24	0.015	0.015
240.0	238.0	13.407	35.319	26.558	153.23	4.463	1506.01	13.37	27	0.021	0.018
260.0	257.9	13.252	35.304	26.578	151.76	4.768	1505.85	13.22	33	0.016	0.018
280.0	277.7	13.163	35.293	26.588	151.36	5.071	1505.86	13.12	39	0.019	0.025
300.0	297.5	12.952	35.256	26.602	150.47	5.372	1505.45	12.91	37	0.041	0.051
320.0	317.3	12.753	35.232	26.623	148.88	5.671	1505.12	12.71	66	0.048	0.054
340.0	337.2	12.503	35.191	26.640	147.60	5.968	1504.56	12.46	47	0.023	0.024
360.0	357.0	12.178	35.130	26.656	146.36	6.263	1503.73	12.13	58	0.045	0.050
380.0	376.8	11.823	35.076	26.683	144.13	6.553	1502.78	11.77	56	0.063	0.072
400.0	396.6	11.497	35.034	26.711	141.70	6.839	1502.00	11.45	63	0.022	0.029
420.0	416.4	11.238	34.993	26.727	140.49	7.121	1501.37	11.18	62	0.040	0.043
440.0	436.2	10.900	34.943	26.749	138.54	7.400	1500.48	10.85	59	0.079	0.093
460.0	456.0	10.537	34.901	26.782	135.62	7.674	1499.48	10.48	50	0.035	0.034
480.0	475.8	10.459	34.894	26.790	135.25	7.945	1499.53	10.40	35	0.008	0.008
500.0	495.6	10.250	34.864	26.803	134.19	8.215	1499.12	10.19	33	0.017	0.020
550.0	545.1	9.722	34.816	26.856	129.76	8.876	1498.00	9.66	135	0.005	0.005
560.0	555.0	9.703	34.813	26.856	129.91	9.005	1498.10	9.64	91	0.007	0.004





SHIP : HMAS COOK - Plessey
STATION NUMBER : 15 (THROUGH THE CRUISE)
STATION NUMBER : 15 (THROUGH THE YEAR)
DATE : 18-FEB-1987 (DAY NUMBER 49)
START TIME : 0912 GMT = Z
CRUISE : CO15/87
POSITION : 39:12.00S 169:17.00E
CAST DEPTH : METRES
BOTTOM DEPTH : 533 METRES

PRESS	DEPTH	TEMP	SAL	SIGMA-T	SVA	G.A.	Sound	Pot.Temp			
10.0	9.9	18.775	35.324	25.327	263.95	0.264	1518.09	18.77	18	0.002	0.012
20.0	19.8	18.770	35.358	25.355	261.71	0.527	1518.67	18.77	39	0.005	0.008
30.0	29.8	18.776	35.360	25.355	262.34	0.788	1518.88	18.77	41	0.000	0.006
40.0	39.7	18.784	35.355	25.349	262.94	1.051	1519.06	18.78	34	0.004	0.004
50.0	49.6	18.784	35.351	25.348	263.39	1.314	1519.21	18.78	37	0.004	0.003
60.0	59.5	18.591	35.308	25.361	262.39	1.577	1518.58	18.58	26	0.297	0.337
70.0	69.5	17.261	35.176	25.588	241.05	1.829	1514.53	17.25	22	0.402	0.398
80.0	79.4	15.822	35.211	25.951	206.72	2.053	1510.45	15.81	29	0.434	0.379
90.0	89.3	14.897	35.284	26.215	181.92	2.247	1507.99	14.88	31	0.176	0.163
100.0	99.2	14.324	35.320	26.366	167.76	2.422	1506.44	14.31	32	0.099	0.060
120.0	119.1	13.901	35.291	26.434	161.84	2.750	1505.46	13.88	15	0.051	0.122
140.0	138.9	13.605	35.334	26.528	153.36	3.062	1504.86	13.58	26	0.041	0.042
160.0	158.7	13.395	35.319	26.560	150.81	3.366	1504.51	13.37	27	0.016	0.018
180.0	178.6	13.266	35.310	26.580	149.50	3.667	1504.41	13.24	30	0.022	0.023
200.0	198.4	13.113	35.283	26.590	148.96	3.965	1504.20	13.09	27	0.027	0.026
220.0	218.2	12.890	35.245	26.605	147.98	4.263	1503.74	12.86	19	0.020	0.024
240.0	238.0	12.743	35.236	26.628	146.35	4.557	1503.60	12.71	22	0.010	0.009
260.0	257.9	12.625	35.202	26.625	147.07	4.851	1503.48	12.59	25	0.039	0.044
280.0	277.7	12.456	35.187	26.647	145.43	5.143	1503.22	12.42	24	0.012	0.018
300.0	297.5	12.222	35.134	26.651	145.38	5.434	1502.70	12.18	26	0.045	0.044
320.0	317.3	12.001	35.105	26.671	143.86	5.723	1502.22	11.96	27	0.021	0.022
340.0	337.2	11.814	35.052	26.666	144.77	6.011	1501.83	11.77	12	0.035	0.036
360.0	357.0	11.552	35.021	26.690	142.75	6.299	1501.27	11.51	27	0.037	0.049
380.0	376.8	11.194	34.965	26.714	140.79	6.583	1500.30	11.15	20	0.037	0.026
400.0	396.6	10.986	34.938	26.730	139.52	6.862	1499.88	10.94	24	0.040	0.054
420.0	416.4	10.560	34.876	26.759	136.96	7.140	1498.64	10.51	23	0.043	0.045
440.0	436.2	10.284	34.850	26.786	134.59	7.413	1497.98	10.23	28	0.026	0.020
460.0	456.0	10.128	34.831	26.799	133.67	7.681	1497.76	10.07	23	0.025	0.028
480.0	475.8	9.798	34.789	26.822	131.64	7.947	1496.89	9.74	40	0.122	0.113
490.0	485.7	9.589	34.772	26.844	129.54	8.077	1496.35	9.53	54	0.040	0.041



DISCUSSION

This report presents oceanographic data for three cruises made in summer in the south west Pacific ocean from 1984 to 1987. Winter data are to be presented as a separate report (Hamilton and Boyle, 1989). Detailed analyses are not made in these reports, but pointers are given to some of the main features of interest in the data. A more detailed analysis of some aspects of the surveys and the circulation of Antarctic Intermediate Waters may be found in Hamilton (1990). It should be noted that salinity data from the VCTOD probe used is not well calibrated, and was subject to large unexplained shifts between stations for cruise SEAMAP 3. The salinity data appears to be self consistent for cruise SEAMAP 5 but this cannot be stated with surety. Only Nansen data were taken on SEAMAP 1. Sources of additional data for each cruise are given when known, but a detailed search for other data sources has not been made. Investigations were being carried out west of North Island, New Zealand by several organisations, including New South Wales University (Dr Jason Middleton) which may have obtained data during the SEAMAP cruise periods, particularly from CTD and current meters.

ACKNOWLEDGEMENTS

Data logging, winch operations and station keeping were controlled by HMAS COOK naval staff, and bridge watchkeepers made the wind and sea state observations given in this report. The bulk of the CTD data processing programs were written by Dr N. White, and were made available to RANRL by CSIRO Marine Laboratories Hobart. This generous assistance is much appreciated. Some of the drawings for SEAMAP Survey Five were prepared by Mr S. Penfold, with Mrs Pat Vlaming the tracer for the majority of diagrams. Mr Martin Zile of Hydrographic Office North Sydney and Dr Mark Irving of Maritime Systems Division provided useful information on reading and decoding the VCTOD data from the HMAS Cook data logger tapes. Task Manager of Project SEAMAP is Dr M.V. Hall.

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APPENDIX I

PARAMETERS CONTINUOUSLY RECORDED ON THE HMAS COOK HP1000 DATA LOGGER

PARAMETER	INSTRUMENT	SAMPLING RATE
Time	Clock	0.1 s
Position Fix	Satnav	10 s
Ship's Heading	Gyro Compass	1 s
Ship's Speed	Electromagnetic Log	1 s
Depth	SNBESS	1 s to 1 min *
Depth	AN/UQN-4 (BBES)	0.1 s to 1 min *
Sound Velocity Conductivity Temperature Oxygen content	VCTOD Instrument Package (Plessey)	1.66 Hz *

* Sensor data referred to in this report.

PARAMETERS CONTINUOUSLY RECORDED ON THE HMAS COOK HP1000 DATA LOGGER

PARAMETER	INSTRUMENT	SAMPLING INTERNAL LOGGING
Pitch Roll	Gyrocompass Gyrocompass	0.2 s 0.2 s
Atmosphere Pressure	BUMET	10 s
Wind Speed Wind Direction	Anemometer Vane	1 s * 1 s *
Wave Height	Datawell Waverider buoy	0.1 s
Air temp (dry bulb) Port and Stb'd Air temp (wet bulb) Port and Stb'd	BUMET	3 s
Global short wave Radiation	BUMET	30 s

* Sensor data referred to in this report.

PARAMETERS CONTINUOUSLY RECORDED ON THE HMAS COOK HP1000 DATA LOGGER

PARAMETER	INSTRUMENT	SAMPLING INTERNAL LOGGING
Downward Radiation & Air temp	BUMET	30 s
Sea Surface Temp (Upper)	(Plessey)	10 s *
Sea Surface Temp/Salinity	Thermo-Salinograph (Plessey)	10 s *
Sea Surface Temp duplicated (Lower)	BUMET	10 s *
Bathy-thermograph (XBT)	Sippican Expendabl.	0.1 s *

Dead reckoning to be calculated from last SATNAV fix plus gyro/log inputs, and allowing for regularly updated correction. The drift correction ideally be able to be made retrospectively to update DR positions. Alternatively, updated drift correction from previous period to be used for period between fixes.

APPENDIX II

LIST OF PUBLICATIONS FOR SEAMAP DATA TYPES NOT COVERED BY THIS REPORT

1	Baker, E.K., Harris, P.T., Hubble, T.C.T., Jenkins, C.J., Keene, J.B., Manning, P.B., Packham, G.H., Pritchard, T.R., Schneider, P.M. and Tate, P.M.	"Geological and Geophysical Results of the HMAS 'Cook' SEAMAP Cruise 1-86: Tasman Sea and Polynesia". Univ. Syd. Ocean Sci. Inst. Rep.30, p.32, 1988
2	Baker, E.K., Harris, P.T., and Packham, G.H.	"Physical Properties of Sediment Sub-Samples From Cores Collected in the Tasman Sea and Polynesia During the 'SEAMAP' Program, 1985-87". Report No.31, Ocean Sciences Institute, University of Sydney, 1989
3	Hall M. and Bell, M.J.	"SEAMAP 1 Data Report: Volume Backscattering in the Tasman Sea and the West South Pacific Ocean". RANRL Technical Note No.2/86, 1986
4	Harris, P.T., Jenkins, C.J., Packham, G.H., Baker, E.K., Pritchard, G.H., Schneider, P.M., and Manning, P.B.	"Geophysical and Geological Results of the HMAS 'COOK' SEAMAP Cruise 12-87: Tasman Sea and Polynesia". Report No.26, Ocean Sciences Institute, University of Sydney, 1987
5	Hubble, T.C.T., Robson, A.D., Jenkins, C.J., Garces, J. and Packham, G.H.	"Geophysical and Geological Results of the COOK 17-86 (SEAMAP 4) Cruise: Sydney to Cook Strait". Report No.24, Ocean Sciences Institute, University of Sydney, 1987
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Ocean Sciences Institute (University of Sydney) publications listed were prepared under contract for Ocean Sciences Group, Maritime Systems Division, WSRL.

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17 SUMMARY OR ABSTRACT
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Six oceanographic surveys have been made in the south west Pacific Ocean on HMAS Cook from January 1984 to September 1987 as part of an investigation of physical and acoustical oceanographic parameters known as project SEAMAP. This report presents summer survey data for bathymetry, sea surface temperature, wind speed, sea state and swell, and from expandable bathythermograph (XBT) drops, and CTD and Nansen stations. Underway data are mostly presented as four-hourly discrete values on maps of ship track, forming a representative data set rather than a detailed analysis. (The summer survey tracks were also traversed in oceanographic winter; the winter data are presented in a separate report.)

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